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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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DEATH OF PAUL S. MERRIFIELD.

With great regret we report the sudden death of Mr. Paul S. Merrifield, Treasurer and Secretary of the American Meter Company, whose demise occurred at his home, No. 19 Third place, Brooklyn, N. Y., on the 12th inst. The funeral services were celebrated at the residence, on the afternoon of the 15th, and interment was made in Greenwood Cemetery. We propose next week to print a suitable obituary notice.

[Special Editorial Correspondence.]

THE WESTERN ASSOCIATION'S CLEVELAND SESSIONS.

CLEVELAND, OHIO, May 16, 1894.

Dear JOURNAL: After the bustle, activity and tension of a most businesslike day, perhaps one is not best fitted to jot down an impartial account of the many happenings that were crowded into the first day's sessions of the Western Association's 17th annual. Be that as it may, however, my first impression (and are we not told that first impressions are the best?) at the time of writing is this: The Western Association has outdone its great record for holding good meetings—this meeting to my mind is the best it ever held. Perhaps the convincing way would be to tell the story as it was. In the first place, the weather was propitious, although it was fickle. Showers and a trifle of sultriness between were the order of the day, but neither showers nor murkiness could dampen or suppress the ardor of those in attendance, for the Hollenden was everything it should be, either as an abiding place or an assembly room, and the Committee of Arrangements certainly must be considered past and present masters of the art of "arranging." The attendance could not have been better, from either a numerical or representative point of view—the numbers were impressive and the representation could be figured as covering about every State in the Union. The Eastern delegation was particularly strong, and a very notable figure therein was Mr. Goodwin, of Philadelphia, who renewed, rather than testified to his fealty to the Western. I will not attempt to single any of the others out, for it is only necessary to say that the Eastern contingent was welcomed most royally; that it felt itself at home. A passing word of reference to the absent may not be amiss; and your veteran Chief, Mr. Thomas, needs no assurance that his inability to mingle with his fellows was felt. It was, and honestly, if one can so assert from the query, often repeated, "How's the Colonel?" President Jenkins started the order this morning by introducing Mayor Blee, of Cleveland, who welcomed the delegates in appropriate manner, and after Captain White had finished a witty acknowledgment of the Mayor's offer to the Association of the "freedom of the city," one might be forgiven for feeling somewhat dazed. Mayor Blee assured his visitors that Cleveland was proud of her Gas Company, whereas his predecessor, Mayor Rose, never had much affection or regard for it. Possibly, though, Mayor Rose, having in the long ago helped to spank the Company, Mayor Blee felt the necessity of massaging the contusions; very much as humanity sometimes does in cases of the domestic hearthstone. Father spanks the unruly child, and mother wipes the youngster's tears away. Meanwhile I am not to be taken as supposing, let alone believing, that the Cleveland Company is not up to its business—whether it be Blee or Rose who is to follow. President Jenkins' address came next. It was a good paper, well put together, and of the sort that those who know him well would look for. While this is not a time to review it calmly, I cannot help remarking that electricians will not derive much comfort from it; neither will those who favor keeping gas rates at the highest possible pitch extract any balm from between its lines. It was sensible, even and thoughtful. The report of the Committee on Electrolysis was careful and thorough, and likely Mr. Thompson is to be credited with a lot of labor put upon it. Then followed the papers by Messrs. Highlands

and Stratton (the latter paper was read by Mr. Cowdery), and the discussion on the report and the papers was very exhaustive. Some questions were discussed, and the strictly technical proceedings were closed for the morning session; a recess being voted, to last from 12 to 2, in order to enable the Association to visit in a body the exhibition of gas appliances, which, as the JOURNAL predicted it would be, was the finest display by long odds that was ever shown in this country—if, indeed, it was ever exceeded anywhere. Among the other business transacted was the ratification of the new constitution and bye-laws, and the receipt and proper acknowledgment of a telegram from the Pacific Coast Gas Association, also in session in Sacramento, Cal. The visit to the apparatus display was instructive and impressive, and, best of all, was thoroughly inspected by at least 90 per cent. of those attending the meeting.

On reassembling for the afternoon session, a disagreeable surprise was on hand, for when the report of the Committee on Nomination of Officers was handed in it was found that Mr. Littleton had positively declined to allow his re-election to the position of Secretary and Treasurer. His declination was positive, nor could he be induced to withdraw it, and so the Association was reluctantly obliged to acquiesce in his demand to be relieved from duty. Do I say too much when I say that to no other man in the Association does the Association owe its wonderful success more than to wary, methodical, accurate, staunch, loyal, true-hearted "Gus." Littleton? No; I do not put it anything like its strength. For 12 years he was the man in the gap, with every thought and deed for the benefit of the Western's greater honor and glory. However, the officers named were:

President—I. C. Baxter, Detroit, Mich.
First Vice President—W. H. Odiorne, Springfield, Ills.
Second Vice President—S. M. Highlands, Clinton, Ia.
Secretary and Treasurer—J. W. Dunbar, New Albany, Ind.
Directors—E. H. Jenkins, J. W. Stratton, Wm. McDonald, Geo. T. Thompson, Irvin Butterworth, W. M. Eaton, Robert Young, Jas. Forbes and H. Merrill.

The technical part of the proceedings was carried on in good shape, and everything was as smooth and frictionless as if the members were accustomed to holding meetings every day, instead of once in a twelvemonth.—S.

CLEVELAND, OHIO, May 17, 1894.

The second day's sessions have been completed, and everyone is getting ready to enjoy the hospitalities of the local hosts. While the weather to-day was decidedly warm the delegates manifested no disposition to shirk their work, which was kept on in its even way. And this leads me to remark that President Jenkins has a remarkably apt manner of directing an assembly. Promptly at 10 o'clock the business was inaugurated. The paper list was continued in the order of Messrs. Ferrier, Wilkiemeyer, McDonald and Butterworth, each of which provoked solid and sensible discussions. Then came the "Wrinkle Department," which developed plenty of food for thought. So expeditiously was the business carried on that no session will be held to-morrow morning, as it was thought would be necessary yesterday. This leaves plenty of opportunity to visit the local gas plants and to again examine the gas appliance display this afternoon. I should have said before that 16 active and 11 associate members were placed on the lists, and that the next meeting will be held in Pittsburgh.—S.

CLEVELAND, OHIO, May 18, 1894.

Dear JOURNAL: Last night's entertainment wound up the Western's Seventeenth Annual in nothing short of a blaze of glory, the banquet having been a most brilliant affair. Mr. Greenough presided with tact, wisdom and wit, and the speeches were most enjoyable, notably that by Capt. White, who fairly beat his own record; and what greater credit can I give him? The banquet hall was a panorama of pleasure and sociability; the Hollenden Hotel people carried out their contract to the very letter and in the innermost spirit, and the Committee of Arrangements, of whom the whole souled Higgins seemed the motor, are receiving, in the gray of the morning, no end of congratulation, every bit of which is thrice deserved.

The attendance reached the high-water mark of 225; and amongst the guests were all the chiefs of the executive departments of the city of Cleveland. I should have told you yesterday the Committee of Arrangements had also seen to it that the representation of the gentler sex who visited Cleveland, as guests of the Association, were provided with prettily planned entertainment in the nature of theater parties and drives to points of interest in the city. As a last word, let me say that the meeting was successful in every respect.—S.

[Prepared for the JOURNAL.]

Prof. Lewes and Gas Analysis.

By E. G. LOVE.

In a paper recently read by Prof. V. B. Lewes before the Society of Arts, on "London Coal Gas and its Enrichment," analyses were given of the gas supplied to the city in 1851, 1876, 1884 and 1894. The last analysis, that of the present year, was made by Prof. Lewes, and showed 0.61 per cent. of carbonic acid, whereas the three prior analyses showed none of this impurity.

In the discussion which followed, Prof. Lewes was asked to account for the presence of carbonic acid, in 1894, while none was shown in the other analyses. In reply it was admitted that there was no carbonic acid in the gas now, "but in applying the present process of analysis to enriched gas you always found carbonic acid, although it was not there. The reason was that the absorbent used to detect it had the power also of absorbing minute traces of the enrichers which had been put in, and these got recorded as carbonic dioxide."

While we do not wish to appear hypercritical, there are one or two points suggested by Prof. Lewes' experience to which we wish briefly to refer.

Prof. Lewes does not state what apparatus he used in making the analysis, but as he has formerly expressed himself in favor of the Stead apparatus, it is probable that this was the one employed in the present instance, and referred to as the "present process."

The other analyses given were made by Profs. E. Frankland, Humpidge and P. Frankland, respectively, and we naturally infer that the Frankland, or some similar apparatus, was employed.

The Stead apparatus is one of a class intended for rapid work, and is open to one of the objections found in all apparatus of this class; that is, there is an absorption by the liquid reagent used of other gaseous constituents than that which it is especially desired to remove. It may be said in a general way that in gas analysis accuracy and rapidity are not to be found in the same analytical method. Often rapidity is of so much importance that a certain amount of accuracy can be sacrificed, and still attain the object sought. Thus in the working of many industrial processes it is important to know within an hour the approximate composition of a gaseous mixture. Results which it would require two days to obtain would be of no practical use, although they might be strictly accurate.

Exactly the same thing applies in other branches of analytical chemistry besides gas analysis; where approximate results are all that is wanted, approximate methods can be employed, but no one would expect to get accurate results by an analytical method known to be defective. The question is how far it is advisable to carry these quick methods, whether it be in the analysis of gas, or of some other product. Certainly, it would seem as though any work in the nature of a scientific investigation should command the most accurate and refined methods.

Gas analysis is undoubtedly the most difficult branch of analytical chemistry; and while it presents many problems which, with our present knowledge, we find it difficult or impossible to solve, we can see no reason why it should be judged by any different standard than methods for the analysis of steel and opium.

In the analysis of gaseous mixtures time and accuracy are often gained by prefacing the actual analysis by one or more qualitative tests. Thus in the analysis of a gas by means of liquid reagents, if the sample is found to be free from carbonic acid and other gases absorbed by a solution of caustic potash, it is better to omit the treatment with this reagent and proceed at once to the determination of the hydrocarbons absorbed by bromine. This would avoid the possibility of finding carbonic acid in a gas which did not contain it although it would not remove the probability of obtaining too high a result in carbonic acid if this impurity was present.

U. S. Consul-General Frank H. Mason, on Gas Motors for Street Railways in Germany.

With an Introductory Note, by MR. WILLIAM E. MCKAY.

[*Introductory Note.*—Once in a while it has happened that among the consular agents of the United States have been appointed one or more who take an especial interest in observing the progress of the gas industry and the advance of kindred chemical manufactures, in the several districts to which the agents have been appointed. Consul-General Frank H. Mason, at Frankfort-on-the-Main, has recently made a very interesting report on "Gas Motors for Street Railways." A few months ago the same gentleman made a short report on the general use of "Gas

Motors in Germany." Mr. Mason was Consul-General at Frankfort in 1890, when he contributed to the summarized report on "Gas in Foreign Countries," collected by the State Department through its commercial representatives distributed throughout the world. These reports give evidence not only to the personal interest of the agents, but also to the importance of the industry.

The conditions under which gas is made and sold in Germany are very different from those which prevail in the United States; the gas itself is much the same as our own coal gas, but the difference is not so much in method of manufacture as in the deeper strata of restrictive legislation, multiple taxation, fostered competition, and a fundamental economy in the general mode of life.

For a long time the continuance of good dividends by gas companies everywhere, depended upon the utilization of bye-products. Now, in the growth of the use of water gas in the United States, we have almost lost bye-products, as almost all the coal and oil leaves the apparatus as fixed gas. On the other hand, both in the United States and in Germany, plants are in operation where gas is the bye-product and the manufacture of ammonia, and of tar and other substances, has become the main object. Meanwhile, light from gas is demanded at ever lessening prices; then to supply it successfully the consumption must be increased. It is not enough that the total output grows, the output per capita should materially increase. The effort of German gas makers to secure this increased consumption seems to be earnest, and an apparent increase of 20 per cent. per annum in the number of gas motors operated would argue that the day consumption is well cared for.

If gas motors are to come into use on street railways, even if only in the smaller cities, and in towns of large area but of small population, the general gain to the gas makers will be very great. New consumers are eagerly sought for, but here is a consumer that is a host in itself; one that will stand small, struggling companies firmly on their feet, and give to larger companies a reminiscent taste of the excellent incomes of earlier days.—WILLIAM E. MCKAY.]

There is in the mechanical record of the past year in Germany no fact more noteworthy than the trend of expert opinion in favor of gas engines as motors for street and suburban railway cars. This has come at a period when electricity seemed to be on the point of replacing and superseding all other forms of motive power for this special purpose, and when the construction, equipment and economical working of street railways have been more than ever before in this country the subject of practical experiment and scientific study.

In a general way Germany has hitherto been far behind the United States and some other countries in the adoption and extension of street railways. The rapid increase of population in the cities and industrial towns has recently attracted special attention to this subject, and, before investing their money and giving up their streets to tramways, the various municipalities have, with characteristic foresight, taken up the study of the several competing systems in a very thorough and deliberate manner.

The objections to horse railroads are well known. Although cheap and easy of construction, and although horse cars are the simplest and lightest vehicles that have ever been devised for such a purpose, such roads are unclean and, in the end, expensive to operate. Horses and forage are both costly in Germany; the animals are exposed to accident and disease, and in case of war would be subject to immediate conscription for military purposes.

Steam tramways are noisy, terrifying to horses and timid people, dirty by reason of smoke and soot from the engines, and, what is still more serious, they can only be operated profitably on lines where the travel is regular, constant, and sufficiently heavy to require one or more cars to be attached to the motor vehicle. Recent improvements have modified to some extent the first two of these difficulties. There are in operation, for instance, on the suburban line between Wiesbaden and Bieberich, locomotive cars which run quietly and emit little or no soot or smoke; but they cost nearly $6,000 each, require both an engineer and fireman, and are for other reasons impracticable for street service in crowded cities.

Cable roads are costly to build. Their construction involves the tearing up of streets and underground constructions, which the German municipalities are loth to permit, and in operation the cable must be kept going throughout its entire length, with all incidental loss of power through friction, the same during all hours of day or night, no matter what may be the varying requirements of travel. Then, unless a double line is provided, the breakage or jamming of the cable or any accident to the engine paralyzes instantly the entire system. So that, while cable roads are admitted to be most advantageous for steep ascents, they are considered in this country as open to grave objections for ordinary use in crowded streets.

Electricity, as now applied, solves many of the difficulties which have hitherto beset other methods of propulsion, but everyone knows that the noise, the danger and unsightliness of overhead wires, and the high cost, as well as the waste and uncertainty of underground lines, are serious objections, and entail general complaint. Here, too, the current must be worked at full energy whether there are 10 cars or 20 or 50 in service at any specified moment. Of course, all scientists hope and expect that a perfect storage battery system will yet be developed, which will abolish both ground and overhead currents, and make each car independent; but at Brussels and Hamburg, where storage battery cars have been extensively utilized, the accumulators must be changed once in from three to five hours, and weigh from 2 to 4 tons for each car, giving a dead weight and cost of manipulation which, added to the large percentage of loss in electrical energy, leave this method at its present stage open to serious objections from a practical standpoint. Twenty, or even ten years hence, the storage battery motor may be the ideal one, but it is not so yet.

The problem, from the German standpoint, has been to devise a motor which shall render each passenger car independent—one which, during days or hours of increased travel, can draw one or more additional cars, which can be run upon rails laid at any reasonable grade without overhead wires or any subterranean construction; a car which can be started and stopped quickly and surely by one man, which can be supplied in any required number during the busy hours of the day, and when not in use can be run into a shed and left, without consuming or wasting anything, ready for immediate service when needed; a car that shall run silently without hissing steam or defiling smoke, and which shall be withal not too costly in construction or too complicated to be handled and kept in order by an average mechanic.

These requirements, in the opinion of many experts, narrow the choice down to two forms of motive power—coal gas and compressed air. The use of compressed air for such purposes is perhaps still in its infancy, but its advantages are frankly conceded. It is clean and quiet, it causes no smell or unpleasant heat, and the car is under perfect control and is wholly independent of wires or other connections along the line. But in Berne, where air compressed by water power under highly advantageous conditions has been used, it is found that at a pressure of 32 atmospheres 4.2 cubic meters of air are required to produce one horse power, or about 150 cubic feet per horse power per hour. Each car carries 12 reservoirs, with an aggregate capacity of 2,170 cubic feet, which can be filled from the main reservoir in 8 minutes. Thus provided, the car, which at Berne weighs when empty about 7 tons, can run 12 miles, but at an expense of 15 cents per car mile, which exceeds the cost of horse power. On certain lines which lead through luxurious suburbs, where travel is heavy and high fares may be charged, compressed air may be recognized as the ideal motive power of the future. But since it is found that in Berne, with all its advantages of compression by water power, the cost of operation exceeds that of horse cars, the chances would seem to be against its general adoption for ordinary city and suburban lines.

A careful study of the whole subject has led to the adoption in two notable instances of cars propelled by gas engines. These practical trials have been made at Neufchatel, in Switzerland, and at Dresden, and the results in both cases, although not yet perhaps wholly conclusive, have been so favorable that they seem to be worthy of examination. The conditions to be met in Neufchatel and at Dresden were somewhat different, but they are substantially similar to those which exist in many of the smaller cities of the United States.

At Neufchatel there was required a new line 3½ miles in length to connect that city with the village of St. Blaise. Nine-tenths of the distance lies outside of the city limits, and through a district which could furnish but few passengers. The estimates had to be made on a basis of one car either way every half hour during 14 hours of daily service, with an average of seven passengers per car, each paying 5.7 cents for the through outward or return trip. The contract for the equipment was let to a firm in Vevay, which undertook and fulfilled the task of providing motor cars to be driven by gas engines supplied with ordinary illuminating gas from the city mains. These cars are strong and practical in construction; they run quietly, without jar or smoke, stop and start quickly, and the machinery requires to be cleaned but once a week. Each motor car carries 20 inside passengers, and weighs, when filled, about 6 tons. They cost, delivered at Neufchatel, $2,856 each. These cars can pass curves of 100 feet radius, run backwards or forwards with equal facility, and with 7.9-horse power are able to traverse any part of the line—which is 40 feet higher at the midway point than at either ter-

minus—at a speed of 11 miles per hour. Gas compressed to 6 atmospheres is furnished by the city gas company at $1.09 per 1,000 cubic feet, and it is found that under such conditions the cost of gas per car for the round trip—6½ miles—is 19.3 cents, or about 1 cent per passenger for a filled car, or half a cent per passenger for the single run from Neufchatel to St. Blaise or return. This brings the net operating expense per passenger so far below the cost of electricity, horse power, steam, or compressed air that, although the experiment is still new, the problem is thought to be solved in favor of gas for all roads of a similar class.

But by far the most elaborate and interesting experiment is that which has been made at Dresden, where a street railway about 3 miles in length is operated with gas motor cars invented by a German engineer named Luhrig, and built by a company at that place, the engines themselves being supplied by the well known Gas Motor Fabrik at Deutz. This system has been in operation for several months, and has been the subject of careful study and investigation by committees and experts from other municipalities which have in contemplation enterprises of a similar nature. Among others, the city of Nordhausen sent a commission headed by a Government railway engineer to examine and report on the working of the new system, and the report of this committee, while recognizing that there remain some minor difficulties yet to be overcome, declares the system a practical success and recommends its adoption at Nordhausen. At Dessau another line to be similarly built and equipped is now under construction, and will be put in operation during the coming summer. Germany has therefore definitely started toward the adoption of gas motor cars for a certain class of roads, and the experiment has reached a stage at which it deserves the attention of practical engineers in other countries.

The Luhrig motor car is built to accommodate 16 passengers seated within, with standing room for 5 besides the motor man on the front platform and 6 on the rear platform. Passengers are not allowed in Germany to stand in the aisles of street cars holding to straps. Under the American system of crowding and packing one of the Luhrig cars would carry perhaps 40 people. Power is supplied by two double-cylinder gas engines of 7-horse power each, located on either side beneath the seat and carefully inclosed in zinc sheathing, which excludes gas and smells and protects the machinery from dust or contact. Under the framework of the car are located at each end four cylindrical reservoirs, the whole eight having an aggregate capacity of about 360 cubic feet of gas, sufficient to run the car 11 miles over a road in which the grades do not exceed 1 foot in 20. The car weighs, without passengers, 7½ tons, and can be made for from $3,500 to $4,000, according to the number included in one contract. The cylinders of the engine are kept cool by water circulating through pipes leading from a cylindrical reservoir carried on the roof of the car, the heated water rising and the cold descending automatically and with such satisfactory results that after a run of several miles the warmth of the cylinders may easily be borne by the naked hand.

Gas is supplied from the ordinary street mains, and is compressed to 8 atmospheres by a simple double barreled force pump worked by a stationary gas engine or other power, and at this pressure the reservoirs of a car may be filled through a flexible pipe in less than a minute. Gas costs in Dresden $1.05 per 1,000 feet, and, in view of the advantage which such a wholesale, all the-year-round consumption would offer to gas companies, it is safely assumed that most of them will be quite willing to erect compressing machinery at their own cost and deliver the gas to the motors at the prescribed density. The car is managed by one motor man standing on the front platform, who, with throttle and governor, regulates the speed at will from 150 to 240 engine revolutions per minute.

As the double engine gives a motive force of 14-horse power, a second car may be attached whenever needed, thus doubling the capacity of the line during hours or days of greatest activity. A loaded car climbs a grade of 1 in 15 at a speed of 4 miles per hour, but for satisfactory work in all weathers and seasons the grades should not exceed 1 in 20.

In an address delivered before the German Gas and Water Supply Association some weeks ago, Chief Engineer Kemper, of Dessau, submitted a comparative estimate for the construction and equipment with gas motor, electrical, and horse cars, of a street railway 5 miles in length and requiring an outfit of 20 cars for ordinary service. In these estimates double tracks for all, two compressing stations at $2,500 each, sheds, etc., for the gas motor cars, are included; for the electrical roads dynamos and overhead wires, and for the horse cars 120 to 150 animals with the requisite stabling and fixtures, the intention being to show the comparative cost of building and putting into operation the same road under each of the three systems. The exhibit is as follows:

Electrical	$180,880
Gas motor	142,800
Horse cars	133,280

The original construction and equipment account is therefore slightly in favor of horse cars as compared with gas motors, though both are notably cheaper than the electric plant. But this difference in favor of horse power rapidly disappears when the cost of daily operation is taken into account. As the result of careful study, Mr. Kemper states the net operating expense of horse cars in Germany at 5½ to 7 cents per car kilometer, against 5 cents for electric cars and 4 cents for gas motor cars of the Luhrig model per car kilometer. There is thus claimed an economy in motive power of 25 per cent. in favor of gas as compared with electricity, and from 60 to 75 per cent. in comparison with horse power. It may be safely assumed that every town with area and population sufficient to require street car service has already a gas supply, and that gas companies will everywhere be willing to favor this new and important outlet for their product by offering long contracts at favorable rates. Otherwise two or more street car companies could profitably combine and manufacture their own gas supply.

It is, of course, too soon to declare that the entire problem has been definitely solved, and no one will pretend that the Luhrig motors (which have undergone several improvements since being put into service) have reached or even approached the ultimate standard of utility; but the superior economy of gas motors over other means of propulsion for certain classes of tramways seems to be conclusively proven, and from this secure vantage ground whatever difficulties yet remain will surely be mastered.

Retorts and Chimneys.

[A paper read by Mr. Alfred Thomas before the Southwest of England District Association.]

When requested by Mr. Sainsbury, your Secretary pro tem., to assist the Association by preparing a short paper for this meeting, he reminded me that managers of small works, as well as those of large ones, might introduce a subject worthy of description or debate. Though the preparation and discussion of papers is rather out of my line, I shall endeavor to say something upon retorts and chimneys; being the results of practical experience during the past twelve months at Cowes.

At the Cowes gas works we had seven beds of five retorts, the arches of which had been up about 27 years—too long, in my opinion, by at least 7 years. These arches had sunk in the middle, and also appeared as though they were falling over into the retort house. We had noticed for several years that the hydraulic main and ascension pipes were coming over; and the former, being of cast iron bolted together for four beds, was weighty and unevenly supported. We were afraid the flanges would break and empty the main, and so unseal the dips. This actually occurred, for one of the flanges did break, and let the tar run down the front of the bed—quickly igniting and becoming one mass of blaze. This made it most difficult to deal with, but we managed to put on a D clip with cement and chips of wood. This, with a receptacle to catch the leaking tar, enabled us to go on for a time, though we evidently had not come to the worst, for before we reached Christmas a cry was raised that the works were on fire, and the men ran out of the retort house in alarm. It appeared that another flange had broken about 9 o'clock at night, the stokers then being in the mess room across the yard. The tar and liquor had run out and flooded the place, and by the time they discovered it the escaping gas had ignited, and the house seemed one mass of flame. Our first work was to shut off the valves and prevent the gas from coming on us from the holders; then to strike the retort lid and set to work with another clip. When this was done we refilled the hydraulic main and began work again. We had a very narrow escape of putting the town in darkness.

Matters had become so serious that my Directors felt that something must be done; and this "something" meant the rebuilding of the retort stack. The ironwork, being obsolete, was of no further use, and so an entirely new stack was decided upon. At first it was thought that the foundation had given way, as everything in Cowes is "going to sea;" and the question arose what was best to be done. I must mention that the retort house was built upon mud land taken in from the river, and the concrete foundation (put in by our friend Mr. T. Giles) was 14 feet deep. I communicated with him, and he kindly gave me all the information he could upon the matter; but he assured me that the fault could not be in the foundation, and that I must look in another direction for the cause.

Soon after pulling down, the cause of the stack falling was discov-

ered. The tie bars from the front to the back had been built in the brickwork, and they were burnt through; and the weight of the hydraulic, together with the H and ascension pipes, had been too much for the old arches, which had parted in the middle, and so gave rise to all the trouble. A glance at the photograph upon the table will, I think, satisfy anyone here as to the cause. I showed it to a gentleman (not a gas man), and he asked me if it represented some old Roman ruins. I can assure you, Mr. President, that we all thought these "old ruins" would not hold together until some new retorts were ready. It is said that "fortune favors the bold." She favored us, at any rate, whether we were bold or otherwise; for they did hold on until three arches were built, and two sets of sixes were got to work. We then began clearing away the rest of the old stack, which, if anything, was even worse than the first portion.

In place of seven beds of fives, we have erected six beds of sixes; or, rather, we have built the arches for sixes, but put only four in one arch, leaving the two bottom ones out. We have all new mouthpieces, H, and ascension pipes, and separate steel hydraulic mains to each bed, with 6 inch flood gate valves at the back, leading into a new foul main. The buckstaves are of steel 6 inch by 1 inch; two of these being put together with ¾ inch bolts, and pieces of 1 inch pipe 6 inches long between them. These rise 2 feet above the brickwork, and the same sized bars are carried horizontally across to those at the back. Upon these the foul mains and the hydraulics rest.

Then came the question of chimneys. We had one large chimney, which I was anxious to do away with, if possible, as it was evidently "going to sea." So for the first bed we carried up a small chimney a few feet through the roof—running a flue from this to the second bed, but not connecting it; and for the second bed we ran up a 9 inch chimney about 4 feet high. This was found too small, but not too short; so we connected it with No. 1. For No. 3 we built a single brick chimney 14 inches by 14 inches and 3 feet high. This did its work well, so we have adopted this size for all the beds. These short chimneys are not by any means a new thing, but are simplified. To prevent the heat from injuring the roof tiles, we have riveted two sheets of iron together, side by side. These are suspended over each chimney, and are set at the same pitch as the roof. The fumes from the chimneys play upon them, and pass out at the ventilator. I should not recommend this plan in the case of a wooden roof upon a retort house. I am glad to find there are but few of these remaining, and the sooner they are replaced by iron ones the better for the proprietors. It is not very pleasant to have a roof burnt off in winter, and had ours been of wood it would most assuredly have been down.

In my opinion there are several objections to high chimneys for retort stacks. In the first place they are costly; secondly, there is often two much draught on the near benches, and too little on those farthest away. Then the necessary repairs are very costly, as they are mostly required at the top, and there is the danger of pieces of the cap coming down, as in the case of Widnes, where a large foul main was broken, which nearly caused the town to be put in darkness. With regard to short chimneys, I think there are several things in their favor. They are inexpensive (their cost is less than $2.50), no main flues are required, and each bench is independent of the others, and has an equal draught upon it. Besides this, there is decidedly less cut on the sides of the furnaces.

In these retort settings we have a single secondary air supply. Horizontal flues are run to and fro under the bottom flues, taking in the air at the back and leading it to the front. It is then carried up a vertical flue behind the furnace linings, and delivered into the furnaces on top of the coke on either side.

I will now give you a few particulars as to cost of the alterations, including taking down the old beds, new material, the carriage of all goods, and labor, mechanical and otherwise. We obtained seven tenders for the ironwork. The price for castings, including the cost of patterns, was $1.94 per cwt. delivered; and for ⅜ inch steel hydraulics, 18 inches by 15 inches, and 8 to 10¾ feet long, tested and delivered, $54.25 each. The erection of the arches and the setting of the retorts, including the main flues or short chimneys, was let for $410, being $40 per arch and $5 per retort. The total cost of the change was $3,523, or about $585 per bed of six retorts.

Discussion.

Mr. J. Lowe (Weymouth) said he had thought he knew something about short chimneys, but after what Mr. Thomas had stated, his chimneys turned out to be tall ones. But with regard to short chimneys in the ordinary acceptation of the word, he might say that some eight or nine years ago, he decided to erect short chimneys in substitution of a tall one, for the reason that the old chimney was in a dilapidated condition, and one of its side walls formed part of the wall of the engine house, rendering it somewhat inconvenient by heat, and so on. There were only three settings in this particular section of bench; but the construction of the roof somewhat interfered with the putting up of three chimneys. The chimneys were built solid from the ground up to where the flue entered from the setting. They were 14 inch flues, built square to about 2 or 3 feet through the roof, and finished off with a moulded cast iron cap. They ran to something like 18 to 20 feet above the top of the setting; so that his short chimneys were really tall ones. Their cost was $15 each; the Company finding the material. These chimneys gave most complete control over each setting; so that, if anyone wished to introduce the regenerative system, or tar firing, perfect control could be obtained with them. If the section to which he referred had been one of four settings instead of three, he should probably have built two chimneys, instead of one to each setting. He remembered an instance where the proprietor of a small works with a tall chimney, was in a dreadful fix, having all his retorts under fire, and yet could get no gas. On visiting the works, he (Mr. Lowe) saw at once the difficulty was either in the setting or in the chimney; but, not being acquainted with the detail of the setting, he determined to try an experiment. He had an ordinary length of 12-inch cast iron pipe temporarily fixed up in one corner to relieve one of the settings; and, in a very short time, the gasholder began to rise. He erected a short chimney; and within a week half the settings were idle. A second short chimney was also put up; and since then there had been no trouble. He also referred to the satisfactory experience with short chimneys at the Dorchester gas works; and he described the chimneys erected by Mr. Ineson at the Ventnor gas works. These, he said, were built of 4½ inch firebrick, with angle iron at each corner, and they were carried a few feet through the roof. Mr. Ineson was obliged, from structural considerations, to build the chimneys on a portion of the arch; so that it was of the utmost importance that it should not be overweighted. He believed Mr. Ineson estimated that these chimneys cost $15 a setting during the duration of the setting. In his opinion, the days of tall chimneys were numbered.

Mr. J. J. Jervis (New Swindon), speaking from an experience of over 18 years, testified to the advantage, in a medium sized works, of having a short and separate chimney for each bed of retorts. He had 8 beds of 5 single retorts; each bed having its own chimney, with a 9 inch square flue. The chimneys projected about 5 feet above the roof, and the total height was not more than 25 feet. With these they could adjust the draught very much better than with taller ones, and any leaking retort not noticed and stopped by the stoker was "reported" by the chimney top. With tar and creosote firing, a view of the top of the chimney of the bed in operation was of great service, as it assisted them in regulating the supply of the liquid. He remembered once visiting the Windsor gas works, and seeing there a setting of retorts without a chimney; and Mr. Wadeson told him that it heated to the best advantage. For some reason or other, the bed would not heat by its flue into a common stack, but on being cut off for inspection, and having free vent on the top of the bed, it did its work well.

Mr. S. W. Durkin (Southampton) thought one of the chief points in the paper had been missed. It showed them they ought to avoid building the tie bars in brickwork that got red hot. The former engineer of the West Cowes gas works was not singular in building his tie bars in the brickwork, because he (the speaker) knew that some years ago they were built in the brickwork at Southampton, and were all burnt through. When, however, iron retorts went out of use, and clay retorts took their place, very careful bracing was provided external to the brickwork, and that had continued ever since.

Mr. R. O. Paterson (Cheltenham), having been invited by the President to join in the discussion, said he wished, in a few words, to emphasize the fact which Mr. Thomas had very fully demonstrated in his own experience, as to the absolute benefit to be derived from the use of short chimneys upon retort stacks. In using the words "short chimneys" one, of course, was speaking figuratively, and meant a chimney that was very much shorter than the old-fashioned retort stack. Going as far back as the days of Mr. Spinney, they had had short chimneys at Cheltenham, which only passed through the retort house roof, so that they were not by any means new things. His predecessor, Mr. Esson, continued the principle; and he (Mr. Paterson) was thankful to say he was wise enough to follow in their lines. But, of course, the conditions had altered somewhat. They did not put up anything like so large chimneys as in those days. They had introduced regenerative furnaces, which did a great amount of work. They had only one furnace to a through bed containing 16 mouthpieces; and three of these arches worked on a small chimney at the end of the stack. They did nothing

more than put up 4½-inch brickwork, 14 inches square in the clear, and took it through the slates of the roof. They could make about 390,000 cubic feet of gas a day per chimney. This was another illustration of the want of full appreciation of the requirements of the case. In the olden days, they had a condition of things which made it necessary to have a considerable draught to get the air through the furnaces at all; but with the new forms of furnace such a large draught was not required.

Mr. J. Griffin (Fareham) observed that at his works he had two chimneys—a short and a tall one. The latter, he feared, would soon fall down; and he had been rather exercised as to whether or not he should put up in its place a short chimney to each bed. The paper and discussion had decided the point, and he should do this. It saved a lot of time, and they had not a very good foundation at Fareham, so that he should build them on the top of the arch (which was 9 feet long), and then carry them through the roof.

Mr. W. J. Fuller (Bournemouth) said it might possibly be useful if he mentioned that at his works they had formerly a very large middle stack to 8 beds, but owing to the bench settling down in the middle and other accidents (which would happen with clay retorts), the draught was very much impaired. In consequence of this—the stack being in the middle of the eight—it was found necessary, for the benefit of the extreme end settings, to provide other means of draught. For this purpose they erected No. 12 B.W.G. wrought iron shafts to each of the end stacks, and they found this a simple method of getting the fumes up through the roof. The success of these experimental shafts was so great that they they did away with the central stack—entirely confining its use to the two middle beds, and giving each of the other settings a separate stack.

Mr. T. Giles (Bridport) stated that he was the builder of the retort settings at West Cowes which were referred to in the paper. He had to erect them on mud land, which had been reclaimed from the sea, and the foundations were 13 feet deep, with some 7 or 8 feet of concrete under them. He did not think there was any fear of the foundation giving way, because it was one mass of concrete the whole length of the settings. He had noticed, however, that there was a tendency to topple over towards the water; and he attributed this to the land being a little softer near the water than farther away. There was also an indication of the chimney going over. It was, however, most extraordinary land to build upon, and he took every precaution he could. As far as tie bars were concerned, he believed that at the time these retorts were set it was the usual custom to put them through the wall. They could not be burnt out, because they were put through the partition wall between the two ovens, where they could not get red hot. With regard to short chimneys, he had found them answer admirably.

The President remarked that the discussion had been a somewhat interesting one. With regard to tie-bars, he believed, although in early days it was the general practice to build them in the brickwork, it had now become the plan to have them outside. At Salisbury, they preferred to have two uprights of rolled girder, or better still, old railway rails, with a cross piece on the top to carry the hydraulic. These old rails made the strongest and cheapest form of retort bracing that they could have. With regard to the ends, they put two or three uprights, and tied them across the top with tie-bars. As to the remarks which had been made on the subject of chimneys, it was most interesting to hear that they could be supplied so cheaply; but it must be remembered that they could not all do with short chimneys, because in some cases they had to consider the distribution of the fumes. On two sides of the Salisbury works, they had occupied land that was rather higher than the works; so that, if they were to try 4-feet chimneys, they would have no end of complaints as to the foul gas. They had, however, come down to one chimney to every three beds. The chimneys were built round, with a section of retort or drain pipe in them. One of these chimneys was 18 inches at the bottom and 15 inches at the top; and it gave a pull on the furnaces equal to ½ inch of water. Some of the very highest chimneys would not do more than 4-10ths; but this would pull 5-10ths. This was not the highest chimney on the works; but it gave the best results. Referring to the question of cracks in chimneys, and the admission of cold air by them, he said that he believed in a hot chimney. The chimney did not last so long; but if they wanted a good draught and an economical fuel account, they must have a hot chimney.

Mr. Thomas, in reply to the discussion, said he did not make any claim for short chimneys; he had merely simplified them. His chimneys were 3 feet 3 inches in height, and they were built on the top of the bed over a square hole that came through the arch. He might mention that there were only 106 bricks in each chimney, and that the stokers erected them. There was, therefore, no weight which would hurt the arch. When he started the third chimney (which was 14 inches by 14 inches), it was 3 feet 3 inches high, and he kept taking brick by brick off, until he brought it down level with the foul main which ran alongside it. He should have taken it a little lower; but he thought the heat on the foul main would do some damage. As to the question of fumes, he assured the President there were no perceptible fumes. At nighttime they could just see a sort of blue flame issuing from the top of the chimneys.

Short Description of the Stapleton Works Governor House.

[A Paper Read by Mr. D. Irving before the Southwest of England District Association].

In giving you a short description of the governor house erected by the Bristol Gas Company at Stapleton, permit me to explain that I do so only at the very urgent personal request of your esteemed President, who has several times seen the work, and not that it is thought the arrangement or construction possesses any special new feature or merit. But possibly it may afford some suggestion; and thus be of service to members of the Association who may be engaged upon similar work.

The arrangement of a governor house, and the maintenance of a regular and uniform pressure, is a subject of the greatest importance in gas distribution. Too great attention cannot be given to the object of providing a steady, regular pressure, so that, with proper fittings, the consumer may obtain the best possible results from the gas which he purchases, free from all the annoyances caused by lights suddenly flaring up, blackening ceilings, and rendering the atmosphere of rooms stuffy and unbearable; or, in the case of too little, or falling pressure, reducing the consumer to semi-darkness, and that always just at the very moment when he needs a good light, or it may be a good supply for cooking. A learned Bishop has stated that good cooking tended to godliness; and a good regular supply of gas, at a steady pressure, is essential to good cooking.

The employment at the present day of large holders, and the resulting variations of pressure given by the several lifts, together with the varying requirements of manufacturing districts, all make demands upon the efficiency of the station governor. Simple as the operation of this governor may appear, it is no easy matter to secure that perfect control which is desirable. I have repeatedly seen governors give a variation of 5-10ths or 6-10ths, or even more, caused by the reduction or increase of the initial pressure, incidental to the cupping or uncupping of the gasholder. In small or medium sized works, where circumstances would permit, I know of no better arrangement than that designed by Mr. Frank Mead, and erected at Sutton; but any such plan was quite impracticable, and also unnecessary, at Stapleton. The governors employed at Stapleton are not new, having been in use some years, and they are old fashioned.

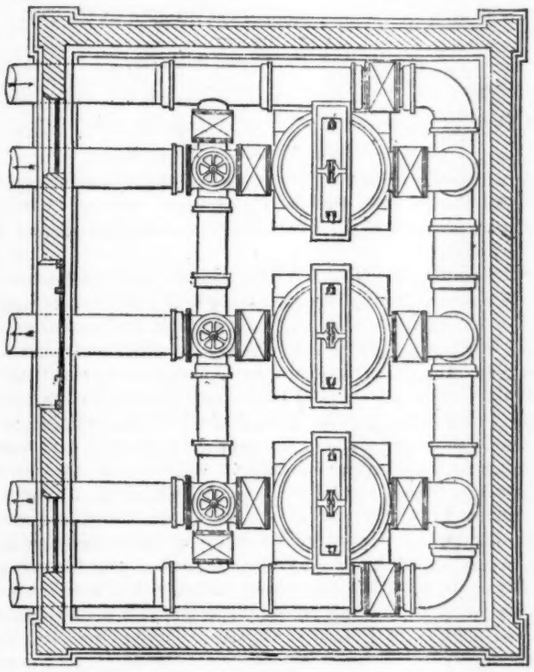
The site of the Stapleton works occupies some 28 acres, and is in many respects well chosen. It is bounded on the south by the Great Western, and on the north by the Midland Railway Companies; and upon the east and west by public roads, each leading into widely separated centres of consumption. The erection last year of "high," "middle" and "low level" railways for the transport of large quantities of material and residuals to and from the works, and the rearrangement and extension of the railway sidings, rendered it necessary that the governors and service-mains, which had hitherto been somewhat scattered, should be concentrated into one convenient place. The site selected for the governor house is at the south end of the works, just about midway between the two public roads named.

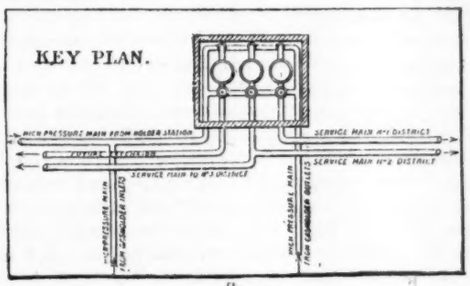
In determining the size of mains for inlets and outlets of governors, due care and consideration was given to the present and probable future requirements of each district, and also to the initial supply to the governors. The supply to the governor house is taken from the outlets of the holders. You will notice from the drawing before you that there is also another supply, which is taken from the high pressure main connecting the inlets of the holders with the outside holder stations, and also with the other works of the Company; so that practically there are three distinct sources of supply to the governor house.

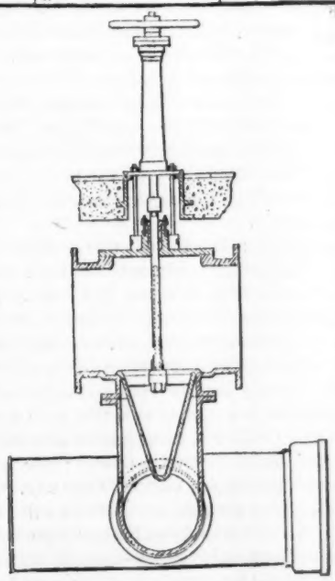
The service mains running east and west have been kept carefully clear of all existing, and all probable future, extensions of buildings and manufacturing plant. The bye-pass, you will notice, is a 3-way valve, and, as first designed, had simply a disc. The cone, which is perhaps a novel feature, and admits of almost perfect control of the flow of gas, was the suggestion of Mr. William Fiddes, in consultation with whom the whole of the work was designed.

Either governor can, in case of need, supply one or more districts; or each and all districts can be supplied through the bye-passes, quite inde-

pendent of the governors. The arrangement affords a supply from the holder outlets in the ordinary way. In case of any accident, alterations or repairs being required to the holder outlet valves or mains connecting the governor house, the other supply from the inlets of the holders







comes into action ; and in the event of both failing, or under any circumstances requiring to be shut off, the governors can be supplied from any of the outside holder stations, or from either of the other manufacturing stations. In a like manner, gas can be supplied from Stapleton to any other station of the Company.

Discussion.

Mr. W. Sugg (London), on the invitation of the President, said that with regard to this question of governors, Mr. Irving had remarked that there was a difficulty in getting over the changing of the gasholders. This was one of the greatest difficulties where they had governors on the works and took the supply direct from the gasholders. Then the pressure of the gas inside where the cone was working would generally take so much weight off the cone that the governor would shut up and give less pressure. It was very rarely they found a good governor giving any variation of pressure any other way—it was mostly in the lesser way. In cases where there was a considerable quantity of gas and then a small quantity being taken, it was a very trying thing for a large governor. One method of getting over this (he did not know whether he was the deviser of it) was to put a smaller governor alongside the large one; so that in the daytime the small governor did the work, and, when a higher pressure of gas was demanded, the larger governor came into action, because, as soon as the small one had done as much as it could, the larger one must come into play. This overcame one of the great difficulties of the governor ; and the other difficulty was to get over the question of the pressure shutting up the governor. This was done now by using valves fitting almost tightly into their seats—something like the cylindrical slide valves of engines, only, instead of being made cylindrical, they were made with a number of teeth. A small governor for the day pressure and a large one to take the heavier pressure at night time had always answered well; and in this way they did not find any trouble with the governor changing its pressure. Another way of doing it was to have a double governor—one governor to take the gas as it came from the gasholders, and regulate it down to the highest pressure that would be required. This prevented any variation on the other governors, because the slightest variation would be thrown on the first governor.

Mr. Frank Wright (London) was also invited to speak. He said that he had not intended to say anything on this subject, because it was one that was almost unknown to him. Some years ago he designed a great number of governors; but he had to design them upon the ordinary rules of long cones and big gasholders. He must say that from his earliest days, he thought the smallest amount of gas that could be made to actuate a valve would be the best system upon which to work. He observed here—and it was about the second time he had noticed it—a system shown of secondary regulation by means of the cone valve. He did not know whether Mr. Irving was aware of the arrangement in use at Liverpool. He (the speaker) thought it was Mr. William King who first brought the system under his notice ; and it was one where they could use a small governor and a large valve. This seemed to him (Mr. Wright) to be an admirable idea. As they must have a man to look after the distribution of the gas, he could very easily from time to time throughout the evening operate the secondary valve. He was quite aware of the great difficulty that the cupping and uncupping of gasholders caused. He had in mind a case where a 36 inch governor was made with an immense large gasholder ; and therefore it required a considerable quantity of gas to operate it. About the time this governor was made, it was the fashion to put in safety-plates with small holders. In the instance, however, to which he referred, the people had erred on the side of safety ; and the governor could not possibly act unless they gave it time. He remedied this by removing the conical valve, and putting in a throttle valve.

Mr. Irving said his task of replying to the discussion was an easy one. As he had explained, it was only the simple arrangement of governor and bye-pass valve which could possibly be of any interest. It was not intended that this bye-pass valve should be used as a secondary valve when the governor was in action. At one of their stations, however, they had in use a valve which was something similar to what Mr. Wright had explained—a valve which was to be supplementary to the governor. But in that case the governor was not large enough ; and the valve was put in as an auxiliary to maintain the supply over the district. The system of using small governors in the way that had been mentioned by Mr. Sugg was, he believed, in use at several places.

What is Chemistry ?

A writer in the *Chautauquan*, in reply to the question in the heading, remarks that everybody who thinks must be impressed by the great variety of things found on this earth, and the question, What does the earth consist of ? must often suggest itself. Among the important results reached in studying the things around us is this, that notwithstanding their great variety they are made of simple things, and these in turn of still simpler—that there are, in fact, only about seventy distinct kinds of matter, and that all the complex things around us are made up of these seventy elements. The solid crust of the earth, as far as it has been possible to investigate it, all living things, both animals

and plants, the air and water, consist essentially of twelve elements. The elements do not, as a rule, occur as elements. They are generally found in combination with one another. Oxygen and nitrogen are, to be sure, found in the air as elements, uncombined; but such familiar substances as water, salt and quartz consist of elements in combination. Thus water consists of hydrogen and oxygen. Hydrogen, the element, is a colorless, tasteless, inodorous, and very light gas that burns readily. Oxygen, the element, is also a colorless, tasteless, inodorous gas. It does not burn, but burning things burn with much increased brilliancy in it. When hydrogen and oxygen are mixed together in a vessel under ordinary conditions, no action takes place. They mix thoroughly, forming a mixture that is also a colorless, tasteless, inodorous gas. If a spark is applied to this mixture, a violent explosion occurs, and this is the signal of a great change. The two gases have entered into chemical combination; they are no longer the gases hydrogen and oxygen; they have entered into combination and now form the liquid water, a substance with properties entirely different from those possessed by the constituents.

Again, chlorine, the element, is a greenish-yellow gas that acts violently upon other things and causes changes in them. Inhaled even in small quantity it gives rise to distressing symptoms, and in larger quantity it causes death. Its odor is extremely disagreeable. Sodium, the element, is an active substance that has the power to decompose water and set hydrogen free. When chlorine gas is brought together with sodium, the two combine chemically and form the well known compound salt, or, as the chemist calls it, sodium chloride. From this the elements chlorine and sodium can be obtained by the chemist. These two examples will serve to show what is meant by chemical combination and by a chemical compound. Chemical compounds are generally found mixed with other compounds. This is shown, for example, in very many of the varieties of rocks, as granite, which consist of three different chemical compounds. It is shown much more strikingly in living things, all of which are made up of a large number of chemical compounds, mixed, to be sure, not in a haphazard way, but beautifully adjusted and working together in wonderful harmony. Just as elements combine chemically to form compounds, so elements act upon compounds and cause changes in their composition. Thus, oxygen is constantly acting upon other things, sometimes slowly, but, in the case of fire, rapidly and with tremendous energy.

It is commonly said that fire destroys things. In fact, it changes their composition, and the principal products of the change are gases This kind of chemical change is the most familiar that is brought about by the action of an element upon compounds. Compounds, too, act upon compounds, and cause an infinite number of changes in composition.

Thus, the food we partake of consists of chemical compounds. In the body these compounds find others and they act upon one another so as to repair the wasted tissues and cause growth. The gas known as carbonic acid, that is contained in the air, acts upon the compounds in the leaves of plants and causes changes that are absolutely essential to the life and growth of the plant.

Look, then, in any direction, and you will see evidence of changes in composition that are constantly taking place, and that are essential to the existence of the world as it is. These changes in composition and the compounds themselves that are involved in the changes form the subject of chemistry. In the light of what has been said it is clear that chemistry must be a very broad science. Remembering that chemical action is the cause of the formation of chemical compounds, that without chemical action the compounds would cease to exist and would be resolved into their elements, it is impressive to think what would take place if chemical action should cease. Most of the things familiar to us could not exist. The solid portions of the earth would, to a large extent, be replaced by the element silicon, something like charcoal, and by oxygen and a few metals such as sodium, potassium and aluminum. Water would be resolved into the two gases hydrogen and oxygen. All living things would fall to pieces, and in their place we should have the gases, hydrogen, oxygen and nitrogen, and the solid element carbon, most familiar to us in the form of charcoal. Life would, therefore, be impossible.

THE Macon (Ga.) Gas and Water Company has been placed temporarily in the hands of a receiver, on the application of Rufus H. Carswell, of Chattanooga, Tenn., who holds a small amount of the Company's mortgage bonds. Judge Speer, before whom the application was made, named Frank Leverett as receiver. In the meantime, holders of bonds and other creditors of the Company need have no particular uneasiness that the Company is about to be wrecked, for those most interested have about matured a plan which will put the corporation speedily in comparatively smooth financial waters.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.]

SEVENTEENTH ANNUAL MEETING, WESTERN GAS ASSOCIATION.

HELD AT CLEVELAND, OHIO, MAY 16, 17 AND 18, 1894.

FIRST DAY—MORNING SESSION.

The President, Mr. E. H. Jenkins, of Columbus, Ga., called the meeting to order at 10 o'clock, A. M., of Wednesday, May 16.

MAYOR BLEE'S WORDS OF WELCOME.

The President—Gentlemen, I have the pleasure of introducing to you this morning, the Mayor of the city of Cleveland, who has kindly come here to say a few words to us. I have the pleasure of introducing Mayor Blee. (Applause.)

Mayor Blee—Mr. President, fellow citizens, and gentlemen from abroad: It gives me great pleasure to meet with you this morning, and to extend to our guests from abroad a most hearty and cordial welcome, and I trust that our people of the city of Cleveland will treat you so kindly while you are here that when you do adjourn, you will adjourn to meet in the city of Cleveland in 1895. (Applause.) That we have fine hotels and a very fine city I think you will admit after you have tried the first and looked over the last, and we hope to have a little finer on your coming here each year hereafter. We have in this city a Gas Company which stands second to none, I think, in the United States. When quite a small boy I was in the railroad business, and my duty was to furnish the Gas Company with coal. The Gas Company at that time, and when it started, required one car load of coal for every two or three days. Before I left the railroad business they were using 15 to 20 car loads per day. I have been out of the business some little time, and so I do not know how many car loads per day they are now using. I wish to state further that the relations between the city government and the Gas Company of the city of Cleveland are of the most friendly and satisfactory nature (applause), and I think thoroughly satisfactory to all our citizens; and if our people can teach an object lesson to this convention, I would be very glad to have them do so. While there is likely to be a good deal of oral gas generated here to-day, you cannot make real gas without coal, and so I would suggest that, after you get through with your deliberations, you extend whatever influence you have towards the coal miners and operators, that we may see if we cannot harmoniously fix up the coal deal which is now being attempted by the convention in session at Case Hall, with the view of starting our factories around this city and all over the country. We have a great many factories here which are now shut down for want of coal. It is to the interest of the working men and of the operators, as well as to the interest of the public generally, to have these factories started. While I do not wish to take up too much of your time, I do want to assure you that the city is yours, and that the Cleveland Gas Company can do as they please with it during your stay here (applause); and if my worthy friend, Mr. Greenough, needs any help I shall be very glad to aid him in any way I can. Gentlemen, I thank you. (Applause.)

The President—In behalf of the Association, I will ask Captain William Henry White to reply.

Capt. White—Mr. Mayor: I believe it was Artemas Ward who said that he preferred to go to the Episcopal Church, because when the minister jawed religion to him he could jaw back. It is one of the time honored customs of the Association to always have something to say back. You have taken the trouble, sir, to come here, and, in your courteous manner, welcome this Association to the city of Cleveland. I am charmed to be able to say that the city, notwithstanding the general reputation of the gas man, is perfectly safe while we are here. (Laughter.) I don't believe you will find dangling on any man's chain as he goes out, the Soldiers' Monument as a charm; nor will any member attempt to carry away the pumping station of the city. Of that you may rest perfectly assured. We only ask, sir, that you will extend your courtesies a little further. You have said that the city was ours. Of course, we take that as the Spaniard assures his guest—that his house and his family are yours, but you must not accept them. (Laughter.) I would like to have you kindly say to us—and I ask it in behalf of the younger element of this Association—that you will say to your Chief of Police that any gentleman wearing the badge of this Association shall be sacred from arrest either in going to or returning from the duties incident to this convention, for some of the gentlemen will need that attention. (Laughter.) I was glad to hear you say that you had spent the earlier part of your working days in the employment of a railroad company. It is not generally known that the industry which we represent is, in capitalization,

second only to the great railroad industry of the United States. We are gathered together in conventions about the country, representing this enormous capital, and representing industries which extend to every city and town all over this great country; and each one of us is in charge of some great and important undertaking. These gentlemen, as you see them before you, do not, I judge, impress you as being of the class of rascals which they are usually held up to be by the public press. There is not a man here who would take your watch and chain from you, unless he did it when you were not looking. (Laughter.) They sit at their ease in the lap of luxury. They roll upon tufted beds of ease, and spend their days in plotting what their night's enjoyment shall be. They are not workmen in any sense of the word. (Laughter.) Therefore your courtesy in coming here is all the more appreciated, because we know that you will throw open the clubs and other resorts that men of that character would naturally drift to. If there is anything that the city of Cleveland wants (now that we have got here—and our friend Greenough assured us we should have police protection if we came here), or if there is anything that this Association can do in the way of administering the affairs of the city for the next three days, we pledge you, heartily and unanimously, our assistance. I say, without any further joking on the subject, that the Association does sincerely appreciate your courtesy in leaving your official duties and coming here to welcome us to this city. We knew that we would be made welcome by the Gas Company; we knew that individually we had friends here who would welcome us; but it is indeed a compliment to have the head of the municipality meet with us this morning and extend to us a hearty and fraternal greeting; and in the name of the Association I thank you for it, and assure you of our appreciation. (Applause.)

The President—I wish to say to our visiting friends, and to those who have made application for membership, that we wish they would make themselves perfectly at home. We want you all to feel that you are one with us; and we shall be delighted to have you enjoy the benefits of this meeting.

On motion of Mr. Ramsdell the reading of the minutes was dispensed with, inasmuch as they had been published; and the President appointed Messrs. W. B. Sellers, G. N. Averill and C. H. Royer a committee to introduce visitors. These matters having been disposed of, the President read the following

INAUGURAL ADDRESS.

Gentlemen of the Western Gas Association: We have reached another milestone in the pathway of this Association. We are here to finish another chapter of its history, to review another year of its existence; a year with its record of successes and failures, a year of intense interest to the gas fraternity.

Again we renew the friendship of years, again we meet with the friends who have been true in the years past, and who we know we can depend upon in the years to come. We come with the determination of seeking knowledge, and the assurance that we will here find those who are ready and willing to impart to us the results of their researches and experiments, and assist us to overcome the many difficulties that present themselves to the average gas manager.

Running through and intermingling with the pleasure of our reunion is the one thread of sorrow and regret coming from the knowledge that one of those whom we have learned to love and respect will meet with us no more in this life. Since our last meeting the all-wise Being has called from our ranks but one member—Mr. Peter E. De Mill, of Detroit, Mich. While we may well be thankful that we have been spared the visitations of other similar afflictions during the year, yet our grief is none the less heartfelt and sincere at the loss of this one. It is a touching feature of our meetings that every year we recall to memory our departed members by frequent mention of the help received from this one or the word of encouragement from the other. And thus do we ever honor their memory.

We meet to-day in the city whose reputation for its beautiful streets, elegant residences, its large business enterprises and its hospitable people, is known throughout the entire country. A city whose name is known to every gas man in America, not alone for its streets, its residences, or its people, but also as the birthplace of the arc electric street lamp in the United States. It is certainly a coincidence, and one that should be of vast encouragement to every gas manager, that we are enabled to meet in this city, and at the present time, under such favorable circumstances.

Only a few years ago the Brush Electric Light Company, of Cleveland, Ohio, installed the first arc lighting plant for street lighting in the United States, at Wabash, Ind. Immediately the fact was heralded throughout the world, and it was predicted that, in a very short time, gas would be done away with entirely, and the plants then in existence would become useless, and be sold practically for scrap iron, etc. We all know, only too well, how ready and willing the "dear people" were to assist this "light of the future" to accomplish all that was claimed for it. Seldom, if ever, had a business venture met with so much encouragement. Time, talent, energy, push and capital without limit were freely given to promote the interests of this newcomer, until the world looked on in amazement and wonder, and asked, "Where will it all end?"

It looked as if those who made the greatest claims for this new aspirant for "light honors" would realize many times more than they ever dreamed of. And yet in all these years of struggle, with this mighty foe to contend with, the gas companies of this country have been enabled to add to the volume of their business, and are to day on a more substantial foundation than ever before in the history of the undertaking in America. And the public are beginning to realize that the so-called light of the future is quite an expensive luxury, and that, for an economical and thoroughly reliable source of artificial light there is nothing equal to the illuminating gas of to-day.

The following clipping, from an editorial in one of the leading daily newspapers of a recent date, shows that the time is near when electricity and gas as illuminating agents must be weighed in the balance, and each must stand on its own merits as to cost, convenience and service rendered, and when this time comes gas companies have nothing to fear:

"It is hardly to be doubted that gas, if furnished at a fair profit to the company that produces it, is a cheaper and altogether more economical illuminant, especially for private houses, and all kinds of houses, in fact, than electricity. Incandescent lamps and arc lamps are expensive, and they deteriorate from the moment they are put in. The illuminating qualities are therefore on a rapidly declining scale. Gas, on the other hand, maintains its full illuminating qualities from the beginning; there is no sliding scale. * * * And now, coming down to the main point, gas economically produced and fairly sold is unquestionably a cheaper and altogether more satisfactory illuminant than electricity. * * * As to lighting the streets with electricity outside of the immediate center, the time has perhaps come to stop and consider. The appropriation for lighting the streets has grown enormously and out of all proportion to the growth of population, but if the people will seek to turn night into day, so to speak, by artificial means, they must pay for the luxury. In this case the cost is paid by the many for the benefit of the few. The question to be considered is whether gas at a fair price and of good quality would not be a more economical illuminant than electricity."

I consider that such articles from the leading dailies of the country show plainly that the public are inclined to place the two illuminants, gas and electricity, on their commercial basis, that each must be judged upon its actual value, and we have much to be encouraged in from such a fact. The public have found out that the light that can be depended upon at all times and under all conditions, *i. e.*, gas, is a commodity that cannot be dispensed with under any circumstances.

The year just closed has been one that has tried the stability of manufacturing industries as they were never tried before. Hundreds of companies, which 12 months ago were considered at the head of the list as to amount of investment, volume of business and earning capacity, have been forced to close their factories, or else very greatly limit their production, and, as a consequence, millions of capital invested in these enterprises have been placed in jeopardy and unable to make the usual return dividends to the owners. Gas undertakings have not escaped from feeling the influence of this widespread, unsettled condition of business affairs, but we can point with pride to the fact that no business has been able to carry itself through such times, fraught with so much danger, as the business we here to day represent. No other business, manufacturing or otherwise, has been enabled to so thoroughly meet its obligations and maintain its reputation for substantial values as to volume of business and earning capacity.

Much of the ability to carry our business through in such a creditable manner, and under such circumstances, is due to Gas Associations of the country. Had such an amount of business disaster swept over our country 10 or 15 years ago as has been the case during the past year, few of these companies could have carried on their business on the close margin of profit of to-day and been able to meet current obligations, let alone the paying of dividends.

Through the bringing together each year of the brightest minds devoted to our profession, and the mingling of their various ideas and experiences, the companies whose representatives have been enabled to

receive the advantage of this concentration of ideas have been benefited, and such companies have had the resultant experience, not of the one individual at the head of their our plant, but rather the experience of all those with whom he was enabled to come in contact during the Association meetings. It is a significant fact, and one going to show the value of these Association meetings, that while we usually devote a part of the time each year to pleasure, yet, during the greater time devoted to business, you will find the members giving close and earnest attention to every matter presented, and showing a willingness to assist to the best of their ability in adding to the general fund of knowledge. As a result you will find that the best managed plants, and the ones which gives the best returns to their owners, are the plants whose representatives are found year after year attending one or more of our Gas Associations.

The question of municipal ownership of gas works continues to agitate the public mind in various localities and many articles on this subject have appeared in the leading magazines of the day. In many instances the writers have shown that they have given the matter careful thought and study, and that they have acquired a fair knowledge of the subject, treated from their standpoint, which generally is that of municipal control or ownership. These articles, together with numerous contributions through the daily newspapers, keep the matter continually before the public.

Coupled with this, is the almost universal demand for lower prices for gas. This latter demand is, I believe, the "gist" of the whole matter. When the public are led to believe that the price charged by the company furnishing them with artificial light is too high, the first thought is that relief can be had by placing the furnishing of such a commodity in municipal hands. It is quite easy to calculate if a company which has a franchise for this particular line of business so conducts its affairs as to be able to pay dividends to its stockholders, that under municipal control these dividends or earnings can be saved and the public be the gainers thereby.

That gas companies who conduct their business on business principles, who keep their plants in first class order, can manufacture and distribute gas at a less cost that if the same service were performed under municipal control, is without question with those who have given the subject careful and unprejudiced thought. The question of municipal control, or rather, as I claim, that of low priced gas, is one which will come to every gas company sooner or later, and one it is best to be prepared for. I am a firm believer in the policy of selling the best quality of gas at the lowest possible price consistent with earning a fair dividend on the investment made.

I believe it to be the best interest of the gas companies themselves to do this. Among the recent examples of this policy, and ones that will be watched with interest by the gas companies of the country, may be mentioned those of Detroit, Mich.; Milwaukee, Wis.; Cleveland, O.; Toledo, O., and Peoria, Ills.

The gas engineer or manager's part in this question is very plain and clear. To his efforts, to the result of his labors, must a company look to be able to meet this question when presented. If, when the time comes to meet this demand, it is found that the plant under his charge is not up with the requirements of the time, if it is found that the most rigid economies that are necessary to be practiced at the present day are not part of his management, then will his company be to that extent handicapped, If, on the other hand, the plant in his charge be found in first class condition and ready to make and supply its product at the lowest possible price consistent with local surroundings, then his company will be able to meet any reasonable demand of the city or its citizens.

I am well aware of the fact that there are times when the demands of the public are out of all reason, and void of anything like justice—when it would seem that the one prevailing idea was to wipe out of existence the company, which, after years of labor, had finally placed its affairs in position to earn a return for money and labor spent. At such times arguments are made and claims set forth as to prices, etc., in other cities, which, while in the majority of cases are far from being facts, yet are at the time difficult for the local company to answer.

In this connection I would suggest that this Association might appoint a commission whose duty it would be to gather together, in detailed and condensed form, full informatton as to the cost of manufacture and distribution of gas in the different cities, taking into consideration the population of the city, the population of the district supplied by each gas company, the cost of material, labor, etc., in manufacture and distribution, the price received for residuals, the candle power and quality of the gas supplied, the miles of mains and sizes, the number of consumers, the amount of gas sold per mile of mains, and also amount sold per meter per annum, with particular mention of the taxes of all kinds per 1,000 cubic feet of gas *sold*, and such other information as would be found valuable; this information to be corrected from year to year, and to be for the exclusive use of the members of this Association. Then, when the question of contract with a city, or in case of agitation of the question of municipal control, or worse still, if an opposition company were trying to force its way into territory now occupied by a local company, much valuable information could be had in a very short time; information that would be of utmost importance to the gas company already in the field, and it would be in a position to answer promptly, and with facts that could not be questioned, statements that are always made by those whose sole aim seems to be to wreck a prosperous and successful company. Several instances have occurred recently where it has cost an individual company a great deal of time and money to get this data, which, if prepared as suggested, could have been obtained in a very short time, in a much more thorough manner and with but very little trouble or expense.

There are few gas companies of to day that do not attempt to introduce gas stoves for cooking or heating purposes, and the success attending such efforts is, in nearly every instance, according to the energy and push used in their introduction. Gas stoves do not sell themselves; it requires persistent, hard work to get them introduced, and continued efforts ever afterward to make successful sales. Gas companies must show, by their willingness to place these appliances on trial, when necessary, their abiding faith in such apparatus, and it is also necessary occasionally to back up that faith with some good, hard earned cash. Nothing tends to create confidence in the mind of a consumer more than the fact that the gas company is willing to put its money into such appliances that he may need and will guarantee successful results from it.

No branch of the gas business will give better returns for the amount of time and effort put forth than the fuel gas department; and one does not need to depend on the question of gas stoves alone, for he will find there are many other ways in which gas can be used for fuel purposes.

There are several manufacturers at the present time who are placing on the market stoves of almost any size and style. These manufacturers have shown a willingness to meet the demand for various kinds of apparatus, and their appliances are giving excellent results. A gas company cannot excuse itself for not pushing this branch of the business by saying it cannot find suitable apparatus. Several important improvements have been made in gas heating appliances, and results are claimed that if true will in a very short time solve the problem of the heating of buildings with a gaseous fuel, and that fuel the illuminating gas of to day.

Several gas companies during the past year or more have been making a specialty of introducing a combined gas and steam heating apparatus that is placed in the room where heat is needed, and these companies report excellent results as to increased sales and the satisfaction of their customers. I am well aware that many gas engineers object to any gas stove or heater that does not have an outlet connection to a flue; but the makers of this combined gas and steam heater claim that the small quantity of gas required, and the construction of their heater, is such that the air of the room is not made injurious to health, but rather is made better by consuming the particles of dust, etc., generally found floating therein.

From a personal experience of three years with these heaters, I am convinced they are an excellent article, and their work has been perfectly satisfactory to our customers. Your Executive Committee, together with the Committee of Arrangements, have invited the manufacturers of gas appliances of all kinds to make an exhibit of the same during the present meeting. Suitable hall accommodations have been secured, very convenient for the members, and you will have an opportunity of making a careful examination of the different kinds of cooking and heating stoves, burners, etc. I trust that every member will devote as much time as possible to this display, and I am certain that everyone who does so will find such time very profitably employed.

In connection with the subject of gas appliances, I wish to call the attention of members to a new field for the use of gas—one that has scarcely been touched upon in this country as yet—gas motors for street railway service. The Messrs. Connelly, after a number of years of careful study and experiment, have recently put upon the market the Connelly motor, designed especially for street car propulsion. At first it was intended to use Pintsch gas, as the supply for the motors had to be compressed to about 150 pounds, in order to carry the amount of gas required to run a reasonable distance. Recent experiments have proven that the ordinary illuminating gas can be used. It requires about 2,000 feet of gas per day for each car, and you can readily see that they would become a valuable customer for a gas company.

The cost of equipping a street railway system with gas motors is about one-half the cost of an electric railway system, and the cost of operating the gas motors is less than the cost of operating horse cars, and considerably less than by electricity.

Another great advantage in favor of gas motors is the fact that each car is an independent motor, and an accident to one does not interfere with the working of the others in the least. This is a very important feature, and one that is greatly desired by the roads operating the trolley or cable system. From a recent article in the *Electrical Review* on "Storage Battery Traction at Washington, D. C.," I quote the following:

"Every available means to attain success was tried, and failed. The experiment has settled many vexed questions, exploded some humbugs, and will be of great value to all persons interested in street railroads. It has made it clear that, up to the present time, science and art have not produced a storage battery capable of supplying power to practically operate such roads as the Metropolitan. Still, the result does not justify absolute condemnation of storage batteries for railroad use, nor destroy hope of an independent railway motor.

"Such a motor is demanded by the public need, the inventive genius of the world is challenged to produce it, and there is a growing faith that, somewhere in the conserved forces of the universe, there is a power which shall wipe the unsightly and obstructive trolley lines off the face of the earth, shall bury the power-wasting cables in their own grave, and turn the faithful car horse out to the enjoyment of green pastures and well-earned days of rest."

It is not improbable that the gas companies may yet supply this demand for an independent and economical motor.

At the regular meeting of this Association in 1892, at Detroit, a committee was appointed to revise the Constitution and By-Laws of our Association. This Committee performed their duty faithfully, and made a report at the regular meeting in Chicago last year. The Constitution presented by this Committee was read and seconded by the Association, and under our rules was laid over for one year, and now comes before you for final action. It is scarcely necessary for me to call your attention to the importance of having suitable rules for the government of such matters as may come before our Association. The Committee having this matter in hand considered that a large number of rules were not needed, but rather that the number should be small, concise in wording, and easily understood. I trust you will give this matter prompt and careful attention.

The various papers that will be presented for your consideration are upon timely and practical subjects. Comment upon these papers is not necessary. The authors selected are well known to all of you and are amply able to handle the subjects in a thorough manner.

I trust that a full and free discussion will be had upon each matter presented, for in this way we are enabled to get the greatest benefit; frequently many ideas are brought out in the discussion following the reading of a paper that were not thought of or overlooked by the author.

The "Question Box" should be a fruitful source of information, but has not had in the past the consideration it deserves. I think the reason for this lies in the fact that the questions are brought before the meeting after every other business has been disposed of, and at a time when every one seems ready for a motion to adjourn. I would suggest that the question box be opened either at the afternoon session of the first day or during the morning session of the second day, so that proper consideration can be given the questions asked.

We are promised a very valuable report from the Committee appointed to investigate the action of electric railway currents upon gas and water pipes, This Committee have given a great deal of time and attention to this subject, and the information they have been enabled to collect and prepare for this meeting will be of great benefit to its members.

In 1892, at the Boston meeting of the American Gas Light Association, a paper was read by Mr. W. R. Addicks, of Boston, Mass., entitled "[illegible] Gas Association and Its Members." This paper created a great deal of interest at the time among the members of the American Gas Light Association, and was afterwards referred to their Council for deliberation, and to report a plan somewhat on the line suggested by Mr. Addicks. The paper presented by Mr. Addicks has been carefully read and studied by the members of the various Gas Associations of the country since that time, and informally discussed by those members when they have met each other.

Quite naturally, a matter that was of such apparent interest to the present standing of these Associations, it being practically a federation of these organizations into one principal or National Association, with various branch or district Associations, found those who being loyal to their own Association, looked with distrust upon anything that might destroy its individuality.

At the 1893 meeting of the American Gas Light Association the subject of "Federation of the Gas Associations," as it was by that time more commonly called, was again brought before that body, and a special committee, with Mr. W. R. Addicks as Chairman, was appointed to further consider the proposed scheme. This Committee have had the matter under careful consideration since that time, and have revised the original proposition in many particulars. They have requested that committees be appointed from the different Gas Associations, and that this general committee meet just before our present meeting in order to fully consder the matter as revised.

At the request of the original Committee, your President appointed Messrs. Geo. G. Ramsdell, A. W. Littleton and B. E. Chollar as a Committee to represent the Western Gas Association at this general committee meeting. It is expected that this matter of Federation will be reported to the Western Gas Association, for action at its present meeting, and its general plan comprises:

1st. That steps towards standards shall be adopted by all Associations.

2d. A system of papers and discussions upon the same topics shall systematically be taken up in the various conventions.

3d. A uniform plan of publication of papers and proceedings in a quarterly magazine.

The Committee expect to be able to report in detail the probable expenditure and income of this last section. The fact that this matter comes first before the Western Gas Association, makes it a very important one, and I trust that it will have careful consideration and be free from any hasty action.

Gentlemen, I thank you for the honor you have conferred upon me by selecting me to preside at this meeting. I shall endeavor to discharge the duties imposed upon me to the best of my ability, but the success of our meeting does not devolve upon the President; its success depends entirely with each and every individual member. May each one of us, when the time comes for us to depart for our homes, feel that it was profitable and pleasant for us to have been here.

This meeting is now in your hands.

[To be continued.]

Utilizing Blast Furnace Slag.

Having said that the disposition of blast furnace slag has long been a source of considerable trouble and expense to blast furnace operators, especially to those concerns who are compelled to remove it a considerable distance from the furnace, *Iron Age* remarks that if a process for the utilization of this slag, shortly to be tried at the blast furnaces of the Edgar Thomson Steel Works, at Bessemer, Pa., proves successful, this trouble and expense will not only be removed, but will enable the pig iron maker to realize a profit instead. In February last the Carnegie Steel Company, Limited, placed a contract with the Roberts Mfg. Company, of Pittsburgh, builders of steel link belting conveying and elevating machinery of all kinds, for the construction of some elevating and conveying machinery of special design. This machinery has been completed and delivered at Bessemer, and is now awaiting a preliminary test, which will be made as soon as some necessary changes in the railroad tracks, now under way, have been completed.

With this machinery it is proposed to take the slag from Furnace D and treat it in such a manner as will make it suitable for railroad ballast, foundations, roadways and other purposes. Briefly, the process consists in taking the hot slag into a series of iron pans, from which it is conveyed to a crusher, where it is broken into cubes 1¼ inches in size. After being reduced in this manner it is taken to a horizontal pan conveyer, which delivers it to an elevator. It is then delivered to a shaking grate, which clears away all dust and dirt, after which the material is loaded on cars run under the elevator, and is ready for shipment. Should the initial test prove successful, contracts will be placed for such additional machinery as may be required to treat the slag from the nine furnaces at Bessemer. The machinery now awaiting test is said to be capable of taking care of 300 tons of slag per day.

THE Irvington and Greenburg Gas Company, to supply villages and private individuals within a radius of five miles of Greenburg, Westchester county, N.Y., with gas, was incorporated on the 15th inst., with a capital of $110,000. The incorporators are Messrs. J. L. Taylor, of Dobbs Ferry, H. D. Lee, of Brooklyn, and J. F. Hume, of Poughkeepsie.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE Chicago offices of the P. H. & F. M. Roots Company, of Connersville, Ind., have been removed to 1405–10 Manhattan Building.

IN our advertising columns will be found an inquiry from Mr. Jerome Penn, President of the Washington Gas Light Company, of Washington Court House, O., who is desirous of locating the owner of two shares of the capital stock of said Company, the certificate for which stands in the name of Messrs. Wren, Macy & Co., of Brooklyn, N. Y. Unpaid dividends of 10 per cent. are credited to the certificate, which makes it worth while looking up. Meanwhile, anyone who knows of the whereabouts of either W. C. Wren, T. G. Macy, or Cromwell Macy—the triumvirate which in 1875 composed the firm of Wren, Macy & Co., which Company in that year constructed the Washington gas plant—whose headquarters were corner of Jay and Water streets, Brooklyn, N. Y., will confer a favor on us by sending the particulars to the JOURNAL office. We hold ourselves ready to pay any reasonable expense connected with the forwarding of such information.

AT the annual meeting of the Winona (Minn.) Gas Company the following result was reached: Directors, H. W. Lamberton, W. H. Laird, M. G. Norton, F. M. Cockrell, Henry Stevens, Wm. Mitchell and H. C. Bolcom. The officers chosen by the Directors are: President and Treasurer, H. W. Lamberton; Vice-President, Henry Stevens; Secretary and Manager, H. C. Bolcom.

IT is said that a movement for the incorporation of an opposition gas plant, at Pottsville, Pa., is underway; but from our understanding of the situation we fail to see where either glory or profit can be counted on by the projectors.

AT last the proprietors of the Coney Island Fuel Gas and Light Company have determined to put the plant in good shape. The betterments are to include a new gasholder, in overground steel tank, calculated to store 150,000 cubic feet, the overhauling of the generating plant, and the placing of a good stretch of 12-inch main.

THE management of the Toledo (O.) Gas Light and Coke Company have determined to put the price of gas for cooking and heating purposes down to 80 cents per 1,000 cubic feet; a separate meter, of course, to be employed.

AT the annual meeting of the Bangor (Me.) Gas Light Company no change was made in the executive management.

ON the second inst., the new management of the Montreal Gas Company issued the following circular to the residents of what is known as the Cote St. Antoine district—the district in which the Coates, or opposition Company, is very active: "The price of gas in Cote St. Antoine is reduced to $1 per 1,000 cubic feet, to take effect from the 1st day of May, 1894. An allowance of 5 per cent. on gas for lighting, and 10 per cent. on gas used for cooking or heating purposes, will be made for prompt payment on the usual quarterly days, making the net price 95 and 90 cents, respectively, and the use of one meter will be given free."

THE San Francisco Bridge Company has been awarded a contract for the construction of a bulkhead for the San Francisco Gas Company at the latter's North Beach station. The bulkhead will be 620 feet long and 206 feet wide, and the estimated cost thereof is $60,000.

AT the annual meeting of the Freehold (N. J.) Gas Light Company the following officers were elected: Directors, David V. Perrine, C. A. Bennett, Frank B. Conover, Chas. B. Ellis and C. A. Bennett, Jr.; President, David V. Perrine; Secretary and Treasurer, C. A. Bennett; General Manager, C. A. Bennett, Jr.

THE Corporation Counsel of Chicago says the city is not bound to carry out the contracts which exist between the Gas Companies and the authorities. Nothing goes in Chicago.

A MONTREAL correspondent forwards the following account respecting the "opening" of the works of the Consumers Gas Company of that city: "Some days ago, at the new works of the Consumers Gas Company, gas was turned into the mains, supplying parts of the city, and the districts of Cote St. Antoine, St. Henri and St. Cunegonde. Arrangements had been made for a formal opening of the works some days before, when it was intended to have a special ceremony, in the course of which Mrs. A. F. Gault, with a silver key, was to have turned on the gas. The death of Mr. Skelton, brother in-law of Mr. Gault, however, necessitated the abandonment of the plan. The opening of the service pipes, for which many citizens in new houses in the West End had expressed an earnest desire, was performed by Mr. Richard White, one of the Directors, in the presence of the President, Mr. Coates, a number of gentlemen interested in the Company, and the chief employees. The plan of the works, which is quite extensive, includes an ample coal storage shed, 125 feet long and 60 feet wide, giving capacity for 2,500 tons of anthracite, equal to 6 months' supply. The coal will be delivered into the coal cars from the canal barges and deposited in the shed with one handling only. There will be three generating plants, equal to a make of 1¼ million cubic feet per day, two of which are now completed, with generators and superheaters 6 feet in diameter, and equal to the production of one-quarter million cubic feet per day; and the third is to be 10 feet in diameter and equal to three-quarters of a million cubic feet per day. No. 3 will be erected ready for next season, and the foundations are about to be built in the present building. Space has been reserved for another building of the same size, which, when completed, will bring the manufacturing capacity up to 2½ millions per day. Alongside the generating house are the boilers, engines and blowers, and above these is the room for storing consumers' meters, etc. Attached to the generators are the washers, scrubbers, condensers, and so on, the oil measuring apparatus being a feature of the equipment. In a substantial brick building near the entrance are being erected 4 purifying boxes, each 20 feet square, two of which are already completed, together with patent center valve and machinery for working any purifier singly or all four together. There will be two Goliath lifting and traveling cranes for lifting the purifier covers when the material is being changed. Space has also been reserved for four additional purifiers of the same size. One relief holder, having a storage capacity of 110,000 cubic feet, is completed, and foundations are now in progress for a large telescopic gasholder, having 2 lifts of 27 feet each, with steel tank 120 feet in diameter. This will contain about 600,000 cubic feet of gas, and will be completed next August. And space is reserved for a third holder of the same capacity, to be completed in the season of 1895, if the consumption warrants it. The meter house is a large and roomy building, with one handsome station meter erected complete, capable of passing half a million cubic feet per day, and the foundations for meter No. 2 are ready. This house also contains a new patent automatic governor, which will regulate the pressure in the mains according to the consumption of gas. The pipe connections and trunk mains are 16 inches in diameter, and arrangements are made whereby an additional 16 inch main can be added, when required in the future. The process adopted is the oil-water process, now in use in Toronto and Ottawa and in all the leading American cities with splendid results, the apparatus consisting of generator, carbureter and superheater. The generator is a firebrick-lined chamber charged with a mixture of 90 per cent. of special anthracite and 10 per cent. of bituminous coal, raised to a state of incandescence by an air blast. The products of combustion thus formed pass into the superheater, where, by the admission of a secondary blast, they are burned, heating the firebrick with which the superheater is filled. When the proper heats are obtained the blasts are shut off, the stack valve closed and steam admitted beneath the grate in the generator. This passing up through the coal and decomposing forms a non-luminous gas, but on entering the carbureter meets the oil for enriching, and the water and oil gas becoming mixed, pass on to the superheater, while by contact with the red hot firebrick they are fixed into a permanent illuminating gas of rich quality. The apparatus has been erected by the Economical Gas Apparatus Construction Company, of Toronto, and is somewhat similar to the Lowe process, but with important improvements, which have been patented by the inventors, Messrs. Merrifield, Westcott and Pearson, in America, Canada and England. All of the machinery has been erected under the careful and able supervision of Mr. Merrifield, the Chief Engineer for the makers and patentees, and the advantages of the system, according to the claims of the proprietors, are that about double the output of gas can be made for the same capital outlay as under the old system. The gas supplied will be from 24 to 26 candle power."

AT the annual meeting of the Glens Falls (N. Y.) Gas Light Company the following Directors were elected: P. S. Merrifield, F. F. Pruyn, F. A. Sabbaton and A. B. Colvin. The officers chosen by the Directors were: President, A. B. Colvin; Vice President, P. S. Merrifield; Secretary and Treasurer, F. A. Sabbaton. The sudden death of

Mr. Merrifield, who died at his home in Brooklyn, N. Y., on Saturday, May 12, will necessitate the holding of a special election.

THE Capital stock of the Hamilton (Ohio) Gas Light and Coke Company has been increased from $50,000 to $100,000.

THE Tacoma (Wash.) Gas Company, formerly controlled by Mr. C. B. Wright, of Philadelphia, has changed ownership, the consideration for the transfer being something over $200,000. It is reported that the new manager will be Mr. R. C. Elliott, of Seattle.

MR. E. A. NEWTON will build the new boiler house to be erected by the Rockville (Conn.) Gas and Electric Light Company.

SOME days ago Messrs. Alexander Lewis and Jerome Croul, Trustees for the stockholders of the Detroit Gas Company, applied for a mandamus to cause the Board of Assessors to strike off the rolls the tax assessment levied on the $1,000,000 mortgage of the Company, and argument on the same was heard by Judge Donovan. Mr. William B. Wells appeared for the Company, and the city's side of the case was prepared by Judge Speed. The Trustees claimed that they had no interest in the mortgage other than that of their trusteeship, asserting that as the assessment is levied against them, if they assent to the levying the stock would be assessed twice, for the local stockholders have already been assessed on the stock as personal property, and the non-resident stockholders, who own $560,000 worth of stock, are required to pay taxes on the same where they reside. Mr. Wells claimed that the contention of the Trustees had been sustained by the courts of several States, and in the U. S. Supreme Court as well. Mr. Speed claimed, on behalf of the city, the right to tax the mortgage because the mortgage lodged the legal title of the property in the Trustees, who were, therefore, responsible as far as the tax was concerned. Having considered the case, Judge Donovan denied the petition, and by common consent the proceedings were withdrawn, only to be renewed, however, on a different line. The new proceedings will be by an application for a writ of injunction restraining the city from forcing the collection of the tax. It is presumed Judge Donovan will deny the petition for an injunction, whereupon the case will be taken direct to the Supreme Court. The petition for mandamus asked that the city be ordered to throw the assessment on the stock from the rolls, but the time for such action has expired and the Supreme Court could not act on the question in time to prevent the levy of this year's tax; but the time for paying the tax does not expire until October, and a decision on the legality of the assessment can be obtained from the Supreme Court in that time.

EDNA KOCH, of 17 Harrison street, Chicago, was arrested some days ago on a charge of larceny and fraud preferred by the Consumers Gas Company. L. A. Wiley, the chief complaining witness, informed the court by affidavit that the defendant had wrongfully made a connection with the gas mains of the Consumers Company on May 5th and had since been obtaining a supply of gas for illuminating her house without expense. The prisoner was released on $3,000 bail, after a day had been set for the formal hearing.

THE Board of Gas and Electric Light Commissioners, of Massachusetts, have taken testimony respecting the petition of certain residents for a reduction in the local gas rate, which has remained at $1.40 per 1,000 since 1891. Mr. Sargent, President of the Company, testified that the works had been virtually rebuilt since 1886, and the system had been changed from coal to water gas, the total expense for which had been met without increasing the capital stock. He further noted that supplies cost the Company 25 per cent. more than the same goods cost other Companies situated near waterways. He also said that up to January, 1894, his salary had been only $1,200 a year, but since that time it amounted to $2,000. He showed that the candle power was good, and that the main system was not particularly faulty. The case for the petitioners was very weak, virtually amounting to the statement of their belief that a reduction should be ordered simply because they thought the price was too high. The Commission took the case under advisement.

MR. J. R. TODD, writing to the JOURNAL under date of May 15, from Natick, Mass., says: "I see that you made some mention of the gas stove exhibition here in Natick, and I thought that you might be interested to know how I succeeded. Well, it has proven a success far beyond my expectations. When I closed up on Saturday night I had 20 orders for gas cooking ranges, all to be set up just as soon as possible, and I have received several orders since then. I know, too, that more will follow. I am also introducing the Welsbach burner, and have in hand a number of orders. I put one into a drug store, alongside of an incandescent electric lamp, and the comparison between the two lights reminded me of the moon's appearance at noonday—the electric being the moon."

THE Secretary of the Commonwealth of Pennsylvania has refused to issue charters to the Lansdowne Gas Company and the Suburban Gas Company in Darby and Swarthmore, on the ground that the Darby Gas Company and the Swarthmore Light Company have exclusive rights in the territories supplied by them.

AT a meeting of the City Council, of St. Paul, Minn., held on the 11th inst., the question of cheaper gas was thoroughly discussed, and the weight of the argument seemed to favor an ordinance putting the price at $1 per 1,000 cubic feet. The Snyder ordinance, which establishes the position of official gas inspector for the city, was adopted. It provides for the appointment of an inspector to be recommended by an examining board composed of the professors of chemistry and physics of the State University and the principal of the Minneapolis High School. The ordinance, which is lengthy, complex and unreasonable, stipulates that semi-weekly tests for candle power shall be made, and that candle power shall not be permitted to go below 25. Failure to comply with the stipulations of the ordinance is to be punished by a money fine, of not less than $100 for each infraction.

THE Ansonia (Conn.) *Sentinel* says that the Derby Gas Company has commenced the work of extending its mains through Ansonia to districts where many prospective gas consumers are anxiously awaiting an opportunity to connect up. The demand for gas stoves in Mr. Nettleton's bailiwick has been so great that quite a waiting list is on record.

ON the 11th inst. the lower branch of the Massachusetts Legislature ordered to a third reading the bill to permit cities and towns to establish gas and electric light plants and supply themselves with light. Mr. Miller, of Wakefield, made a strong and effective plea for the bill, which was designed to give cities something tangible. He denied that the present law was advantageous to the municipalities, and he knew from his own experience that it was not. Mr. Galloupe, of Beverly, knew of no gas or electric light plant being started in the State since the enactment of the law of 1891, though they had full license to do so. He stated that if legislation along the line proposed was continued, no one had the right to complain against national legislation which was ruining local industries. He moved to amend the bill by striking out section 1, proposing an amendment to the law of 1891. Mr. Dowd, of Brockton, said that the bill would enable cities and towns to purchase plants at their real worth, and not their worth to the incorporators. The present law works a hardship to municipalities. Mr. Moriarity, of Worcester, was recorded against the municipal lighting bill of 1891, and didn't believe that it was fair to allow cities or towns to take plants at a cost which did not include the money expended in experimenting and developing the plant. He favored the amendment offered by Mr. Galloupe, though he did not believe that it would eradicate all the evils of the law. Mr. Bennett, of Everett, said the bill reported by the Committee was in favor of the corporation and against the people. If electric light companies made excessive charges, the only way to compel a recognition of public rights was to permit municipal competition. The words "fair market valuation" were a hollow delusion and a sham, for there was no way of determining what was the market value of any plant upon representations made for the corporations by the incorporators. Mr. Spaulding, of Cambridge, was in favor of the present law. Mr. Abbott, of Watertown, was not content to sit silent under the imputation that Representatives who would not vote for the bill before the House must necessarily be in the power of the corporations and against the people. Corporations are not a great and soulless body, but are made up of individuals whose rights the Legislature is bound to protect. As to the fair market value, it is well defined in the existing law. Mr. St. John, of Haverhill, believed the amendment offered by Mr. Galloupe was unfair, and he urged its rejection. Mr. Roe, of Worcester, favored the amendment. Mr. Mellen, of Worcester, hoped no amendment would prevail. Mr. Curtis, of Revere, and Mr. Casey, of Boston, expressed themselves similarly. The amendment was lost by a vote of 76 to 46, and by a *viva voce* vote the bill was ordered to a third reading. By a vote of 68 to 20 the bills relative to the licensing of plumbers and the supervision of the business of plumbing were passed to be engrossed.

THE new issue of stock in the Louisville (Ky.) Gas Company, amounting to $600,000, will be sold at public auction in that city at noon of the 31st inst.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,

PROPRIETORS.

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MONDAY, MAY 21, 1894.

The Market for Gas Securities.

The market for city gas shares was quite restricted during the week, although Consolidated was measurably strong, and the opening to day (Friday) shows a gain of one point in the bid price, or 136½ as against 135½. It is rather early to speculate in respect of what next year's Legislature will do in the matter of regulating gas rates, but there is not much use in shutting one's eyes; rather better it would seem to look the worst in the face. The Brooklyn rate war is already attracting attention from nearby cities, and the murky little muddle over gas prices in the Annexed District, north of the Harlem river in New York city, where gas is being sold at $1.12½ per 1,000—possibly in special instances at $1—can also be considered a factor. People who live in glass houses ought to forego the practice of stone throwing; but they won't. Wherefore, the long-and the-short of it seems to us to be that the year '95 will see gas at a dollar in both New York and Brooklyn. In this event, and we repeat that it is more than probable, investment holders might do well to let the belligerent management take the shares at ruling rates—this applies to the shares of every Company in New York and Brooklyn. The situation in the latter city remains unchanged, and quotations are nominally at last week's figures. Chicago gas is strong, despite a weak general share market, and the general list shows no change of interest.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST., NEW YORK CITY.

MAY 21.

☞ All communications will receive particular attention. The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	136½	137
Central	500,000	50	100	—
" Scrip	220,000	—	100	—
Equitable	4,000,000	100	186	190
" Bonds	1,000,000	—	106	108
Metropolitan, Bonds	658,000	—	108	112
Mutual	3,500,000	100	150	—
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	80	95
" Bonds	150,000	—	—	100
Richmond Co., S. I.	348,650	50	50	—
" Bonds	100,000	—	—	—
Standard Gas Co—				
Common Stock	5,000,000	100	24	27
Preferred	5,000,000	100	77	81
Yonkers		50	112	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	—	105
Citizens	1,200,000	20	50	—
" S. F. Bonds	320,000	1000	—	101
Equity Gas Light Co.	2,000,000	100	—	—
Bonds	1,000,000	—	—	—
Fulton Municipal	3,000,000	100	128	—
" Bonds	300,000		103	—
Peoples	1,000,000	10	—	68
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	98	100
Metropolitan	870,000	100	127	—
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	—	160
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	130	—
" Bonds	1,000,000	—	107	110
Out of Town Gas Companies.				
Bay State Gas Co.—				
Stock	5,000,000	50	17½	18
Income Bonds	2,000,000	1000	60	—
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	78	—
2d " " "	3,000,000	1000	57	58
Buffalo Mutual, N. Y.	750,000	100	121	125
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
Chicago Gas Company.	25,000,000	100	66⅞	67
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	1000	81⅛	81½
Consumers Gas Light Co., Jersey City	2,000,000	100	44	46
Bonds	600,000	1000	84	90
Cincinnati G. & C. Co.	7,000,000	100	192	—
Consumers Toronto	1,600,000	50	184½	187
Central, S. F., Cal.			—	100
Capital, Sacramento, Cal			—	55
Consolidated, Balt.	11,000,000	100	65¼	65½
" Bonds	6,400,000		107	107½
Citizens Gas Lt. Co., Rochester, N. Y.	500,000	—	85	101
Bonds	250,000		—	—
Detroit Gas Co.—				
Con. Bonds	.....	.....	65	70
East River Gas Co., Long Island City	1,000,000	100	—	—
Bonds	500,000	100	89¼	—
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	101
Hartford, Conn	750,000	25	120	128
Jersey City	750,000	20	190	200
Louisville, Ky	2,570,000	50	125	130
Laclede Gas Light Co. St. Louis, Mo.—				
Common Stock	7,500,000	100	16¼	16¾
Preferred "	2,500,000	100	68	72
Bonds	9,034,400	1000	—	85½
Little Falls N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	200	208
New Haven, Conn		25	200	—
Oakland, Cal			42⅝	43
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	108
2d "	2,500,000	1000	104	105
Peoples, Jersey City			160	170
" " Bonds			—	—
Paterson, N. J.		25	99	102
Rochester, N. Y.		50	80	85
Preferred			90	95
Bonds			90	95
Syracuse, N. Y.	500,000	25	—	—
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	65½	66
Washington, D. C.	2,000,000	20	240	—
Wilmington, Del.	500,000	50	180	182

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A Gas Engineer

of 20 years' experience in the manufacture of coal and water gas, and in the building and general superintendence of works, desires an engagement. Satisfactory references can be given.

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WANTED,

The address of the parties holding two shares of the capital stock (Certificate No. 2) of the Washington Gas Light Company, of Washington C. H., Ohio.

The certificate was issued in the name of Wren, Macy & Co., of Brooklyn, N. Y. There is an unpaid dividend of 10 per cent. on said stock. Address JEROME PENN, Prest.
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RECEIVER'S SALE.

By virtue of an order and decree granted by the Circuit Court of the United States, for the Northern District of Georgia, in the case of International Trust Company vs. The Cartersville Improvement Gas and Water Company et al., now pending in said Court, the undersigned, appointed receiver in said case, of all and singular the property of The Cartersville Improvement Gas and Water Company, defendant, will expose to sale at public outcry to the highest bidder, before the Superior Court House door, in Atlanta, Ga., on the first Tuesday in July next, within legal sale hours, the following described property, to wit: The entire Gas Works, known as The Cartersville Improvement Gas and Water Company's Gas Plant, located and being in the city of Cartersville, Bartow County, Ga., consisting of the following lands, fixtures and appurtenances, to wit: A certain tract of land situated in Cartersville, Bartow County, Ga., containing one acre more or less, bounded on the north by Cook street, west by Erwin street, south and east by lands of Amos T. Akerman, deceased, being the tract of land conveyed by Martin Collins to Cartersville Improvement Gas and Water Company by deed recorded in book "A.A." of deeds, page 151, Clerk's office, Bartow Superior Court: also a certain other parcel of land, in the city of Cartersville, Bartow County, Ga., containing two acres more or less, the same being a square tract of land, each side 282 feet long, situate on Cook street, in the Third Ward of said city, boundary commencing at the intersection of the center line of Cook street with the center line of Bartow street, running from said point thence south along the east line bounding the lands of A. M. Willingham 282 feet, thence running east parallel with Cook street 282 feet, thence north parallel with the east line of said Willingham lot aforesaid to the center line of Cook street, thence along said Cook street to the point of beginning, the same being the parcel of land conveyed by William J. Neel to the Cartersville Improvement Gas and Water Company, by deed recorded in book "A.A.," pages 327 and 328, record of deeds, Clerk's office, Bartow Superior Court.

Also all buildings, machinery, improvements and equipments now located on said last described parcel of land, and used for the purpose of manufacturing, conserving, distributing and selling gas, including the engines, piping, boilers, water tanks, gasholders and oil tanks; and also all gas pipes, lamp posts, street mains, service pipes and globes, located in the city of Cartersville, Ga., and connected with said Gas Plant for the distribution of gas through said city, together with all tools, gas fixtures, fittings and supplies, rights, privileges, franchises and appurtenances belonging thereto. All of said property now being in the possession of the undersigned as Receiver aforesaid, and all to be sold by virtue of the order and decree aforesaid, as the property of the Cartersville Improvement Gas and Water Company.

The terms of sale will be as follows: One thousand dollars to be paid by the purchaser to the Receiver in cash, when the property is knocked off at said sale; one-third of the whole purchase price, including said one thousand dollars, to be paid on the confirmation of said sale by said Court; one-third to be paid in three months and one-third in six months from date of the confirmation of said sale by said Court, the said deferred payments to bear interest at the rate of six per cent. per annum from the date of confirmation of the sale as aforesaid, notes therefor to be executed and delivered by the purchaser to said Receiver, with security to be approved by said Receiver, the purchaser to have the right to pay the deferred installments at any time before the maturity thereof. The possession of the property to be delivered to the purchaser on confirmation of the sale by said Court That upon the confirmation of the sale by the Court, and the payment of the first installment of one-third of the purchase price and delivery of the purchaser's notes to the Receiver, for the remaining installments the Receiver will execute and deliver to the purchaser, bond to make titles, on payment of the balance of the purchase money, the purchaser to be required to keep the property in reasonable repair until the purchase price is fully paid.

By virtue of said order and decree of said Court the Receiver will also receive private bids from anyone, at any time prior to the date of the public sale, same to be reported to said Court for acceptance or rejection.

For further information, address William B. Miller, Receiver of Cartersville Improvement Gas and Water Company, Cartersville, Ga.

This 24th day of April, 1894.

WILLIAM B. MILLER,
Receiver of the Cartersville Improvement Gas and Water Company.
986-4

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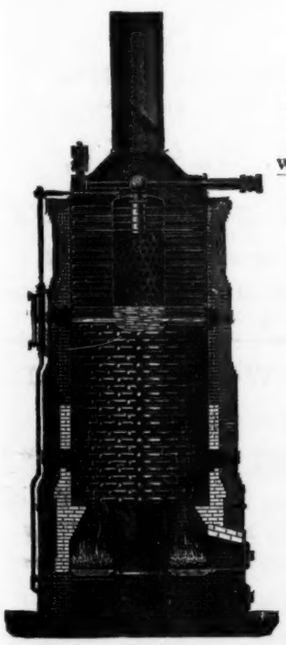

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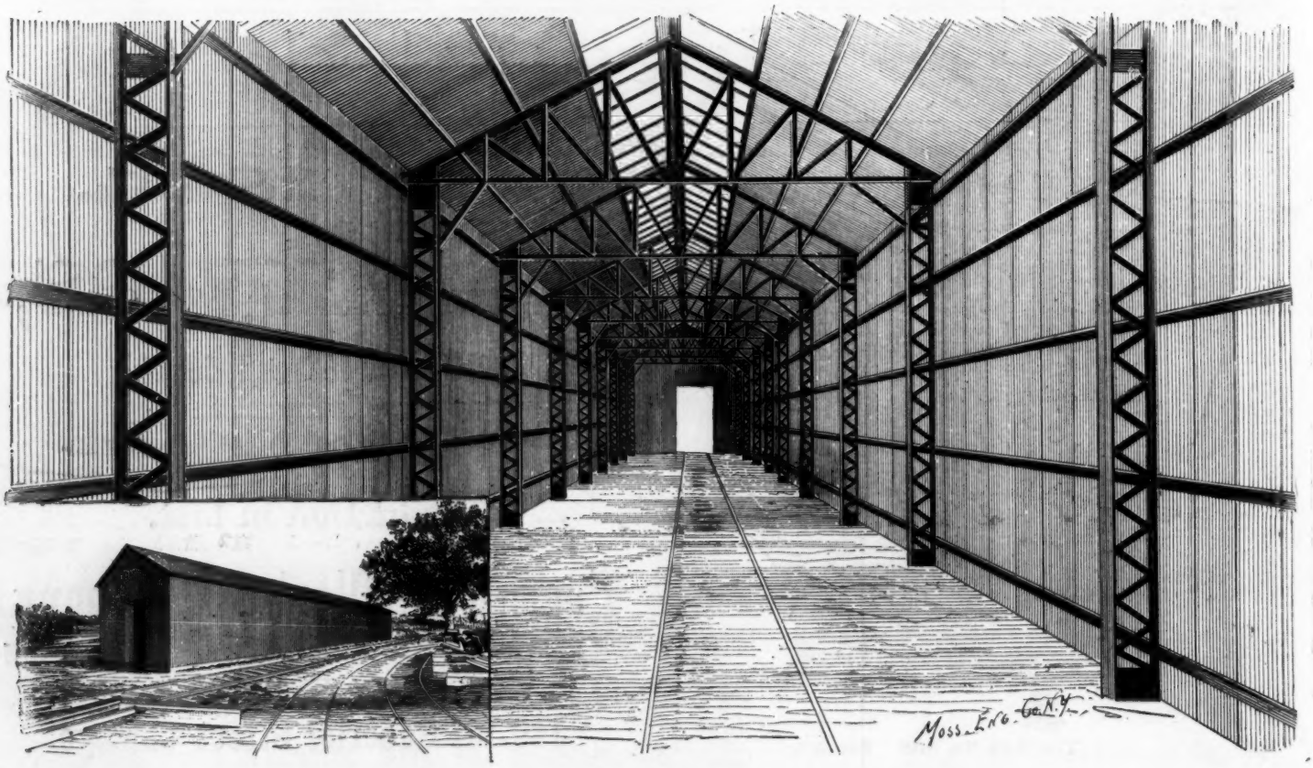

The above illustration is taken direct from a photograph, and is an interior view in a Store Room designed and built by us for our own use here at East Berlin. The construction particularly commends itself on account of the large amount of side wall space applicable for storage purposes, the light being introduced entirely from the roof, no side windows being used, thus allowing all the wall space for storage.

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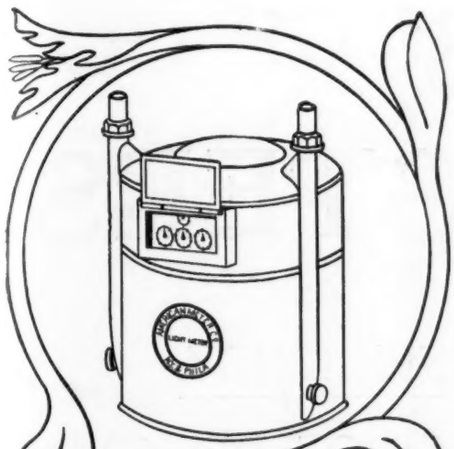

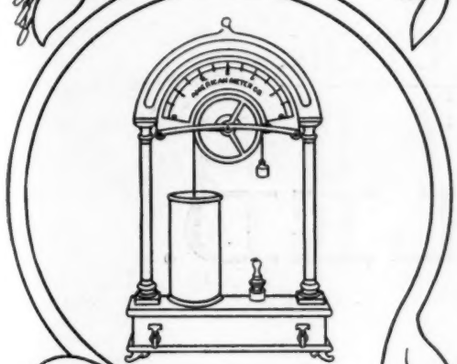

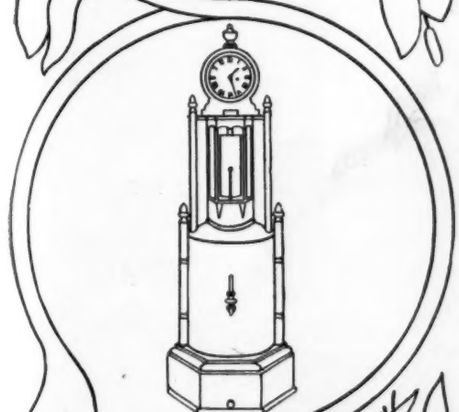

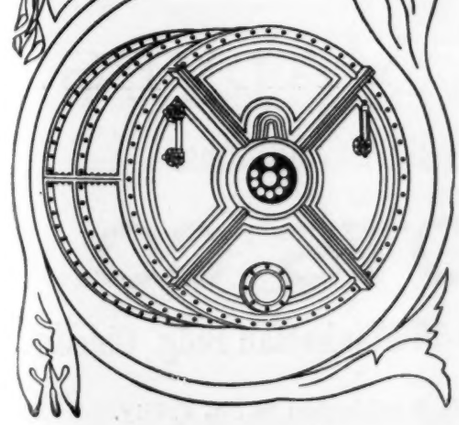

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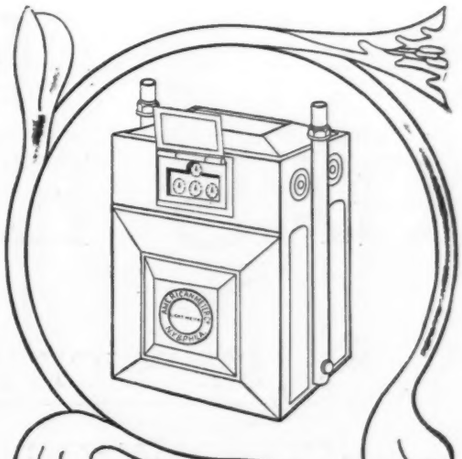
PUBLIC LIGHTING TABLE.

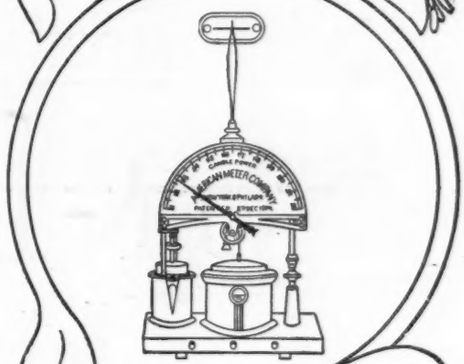
JUNE, 1894.

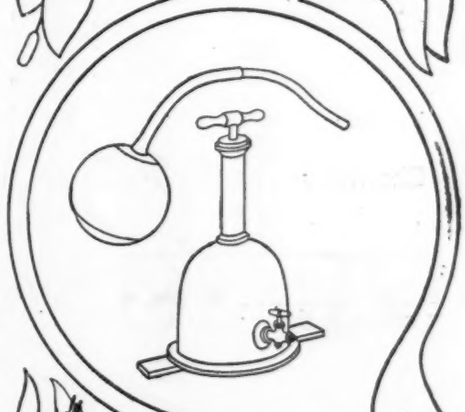
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Fri.	1	7.50 PM	3.30 AM	7.15	3.15
Sat.	2	7.50	3.30	7.15	3.15
Sun.	3	7.50 NM	3.30	7.15	3.15
Mon.	4	7.50	3.30	7.25	3.15
Tue.	5	7.50	3.30	7.25	3.15
Wed.	6	7.50	3.30	7.25	3.15
Thu.	7	8.00	3.30	7.25	3.15
Fri.	8	10.50	3.30	7.25	3.15
Sat.	9	11.20	3.30	7.25	3.15
Sun.	10	11.40 FQ	3.30	7.25	3.15
Mon.	11	12.00	3.30	7.25	3.15
Tue.	12	12.30 AM	3.30	7.25	3.15
Wed.	13	12.50	3.30	7.25	3.15
Thu.	14	1.20	3.30	7.25	3.15
Fri.	15	1.50	3.30	7.25	3.15
Sat.	16	No L.	No L.	7.25	3.15
Sun.	17	No L.	No L.	7.25	3.15
Mon.	18	No L. FM	No L.	7.30	3.15
Tue.	19	8.00 PM	10.10 PM	7.30	3.15
Wed.	20	8.00	10.50	7.30	3.15
Thu.	21	8.00	11.20	7.30	3.15
Fri.	22	8.00	11.50	7.30	3.15
Sat.	23	8.00	12.10 AM	7.30	3.15
Sun.	24	8.00	12.30	7.30	3.15
Mon.	25	8.00	12.50	7.30	3.15
Tue.	26	8.00 LQ	1.10	7.30	3.15
Wed.	27	8.00	1.30	7.30	3.15
Thu.	28	8.00	2.00	7.30	3.15
Fri.	29	8.00	2.40	7.30	3.15
Sat.	30	8.00	3.30	7.30	3.15

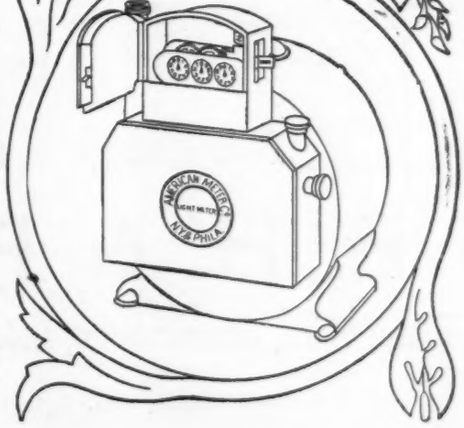
TOTAL HOURS LIGHTING DURING 1894.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	244.10	January	423.20
February	195.30	February	355.25
March	206.20	March	355.35
April	169.40	April	298.50
May	162.10	May	264.50
June	135.40	June	234.25
July	146.30	July	243.45
August	162.20	August	280.25
September	174.10	September	321.15
October	211.20	October	374.30
November	231.00	November	401.40
December	245.30	December	433.45
Total	2274.20	Total	3987.45









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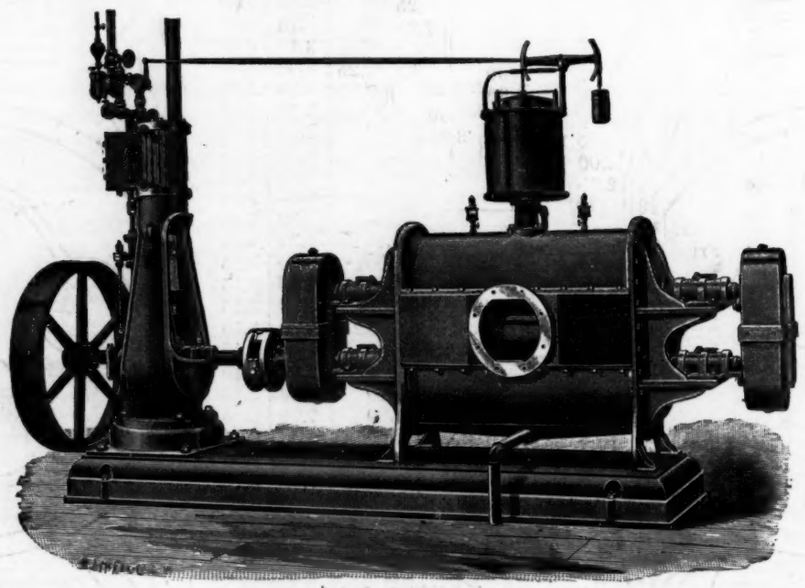

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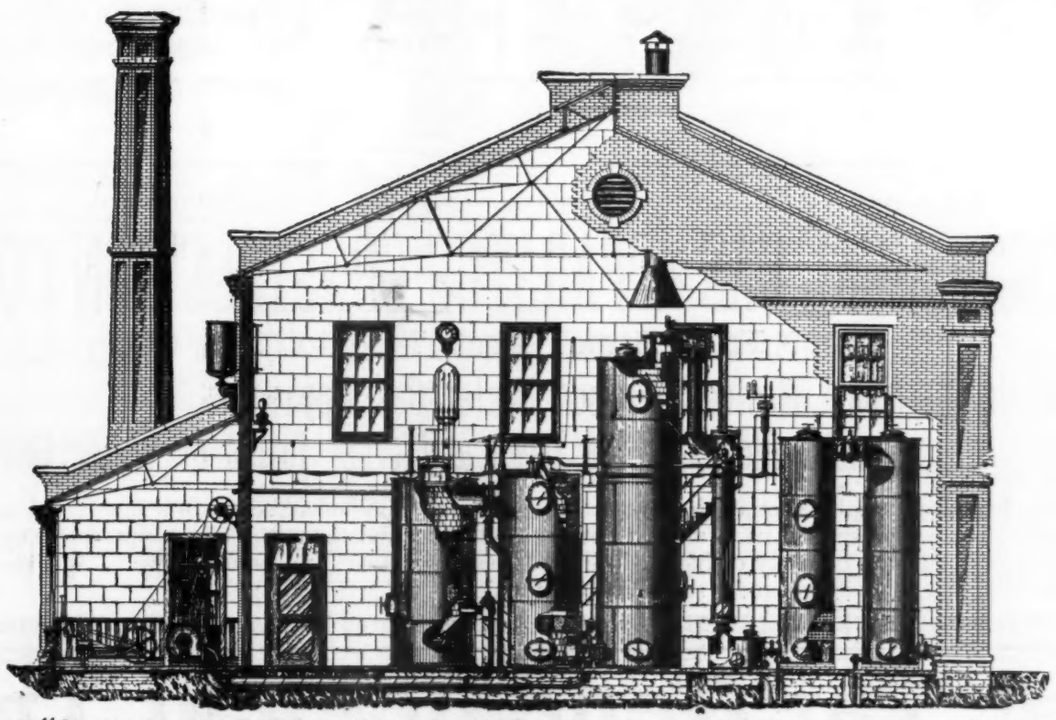

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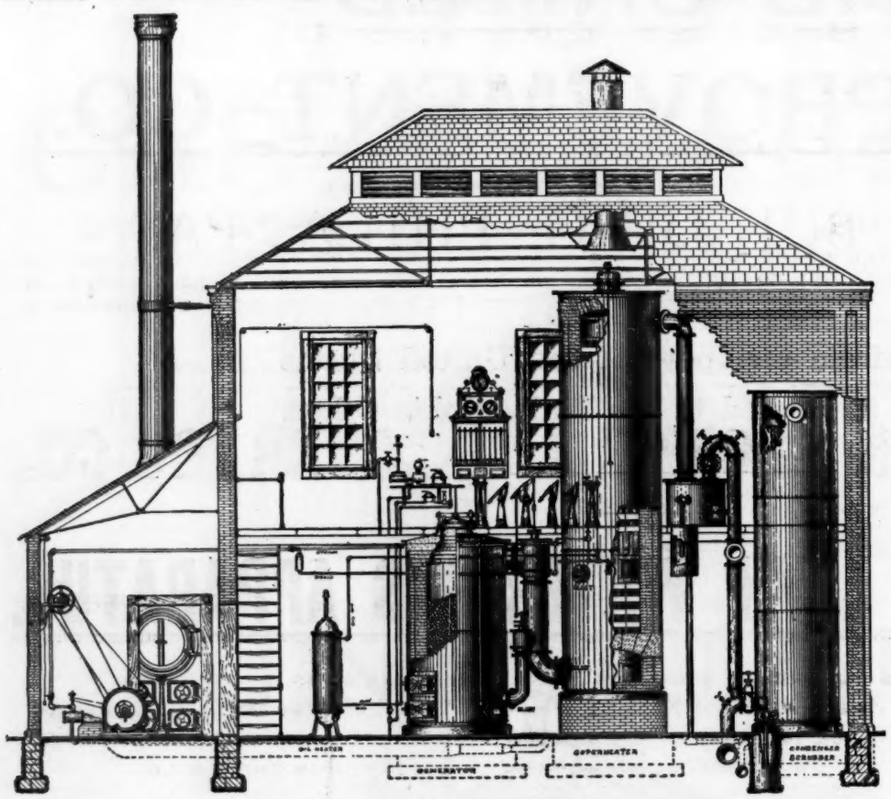

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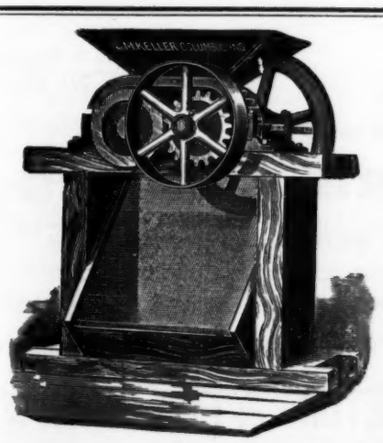

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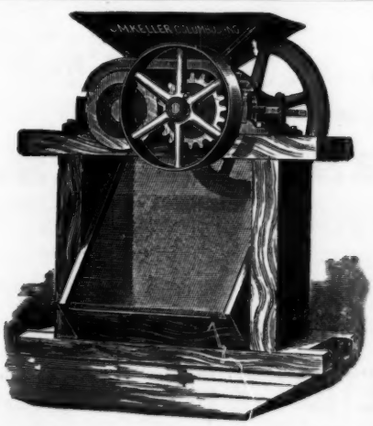

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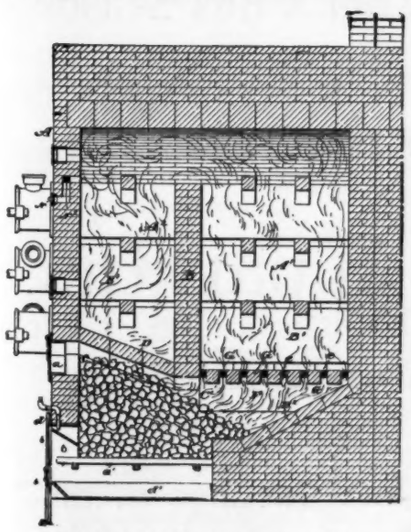

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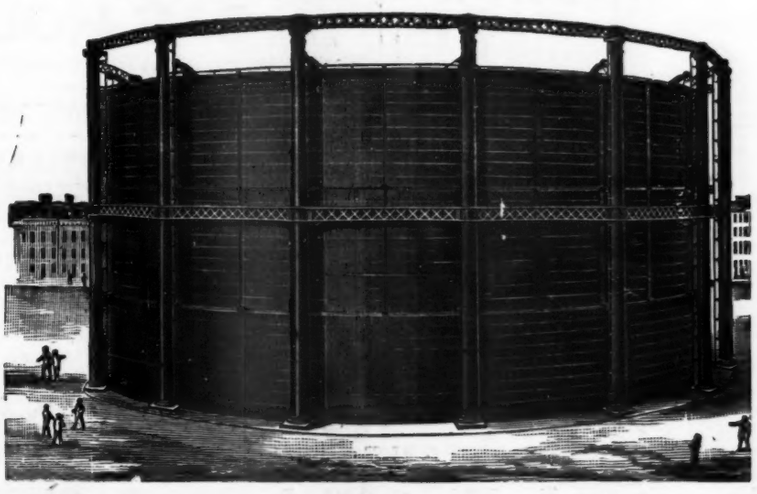

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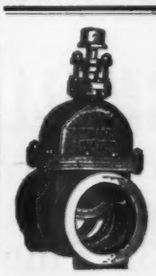

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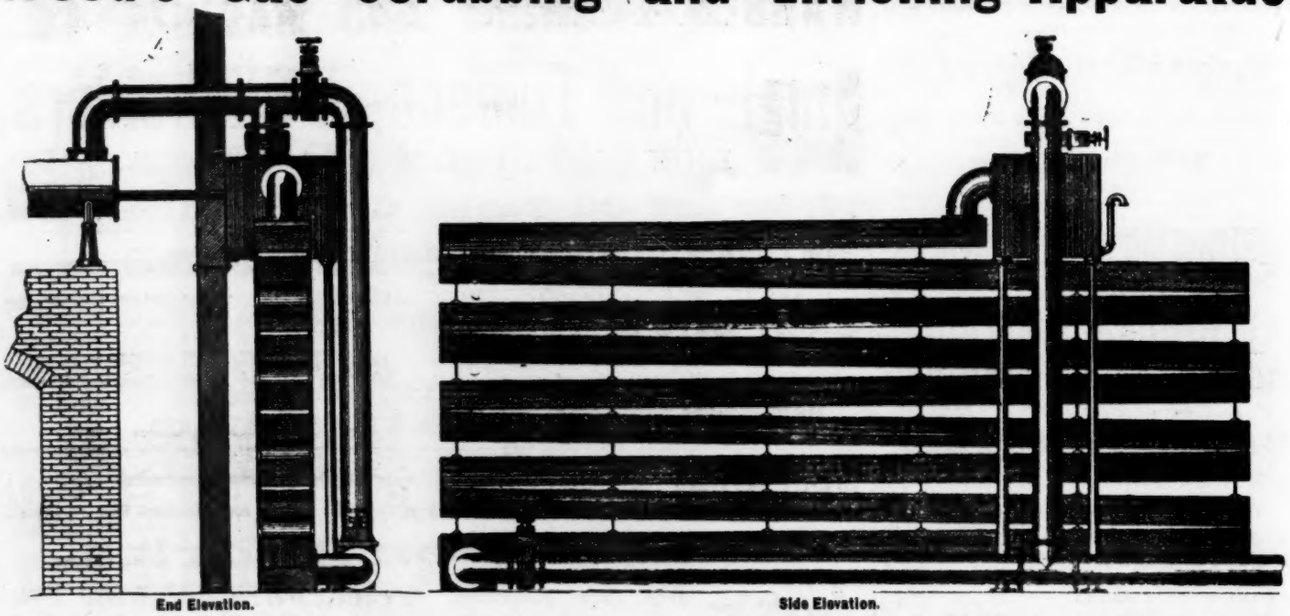

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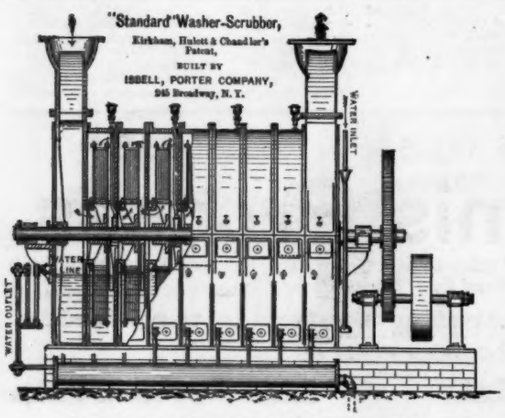

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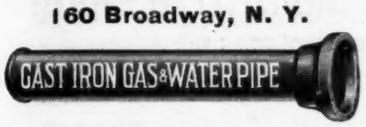

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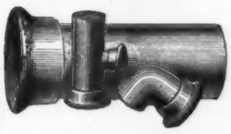

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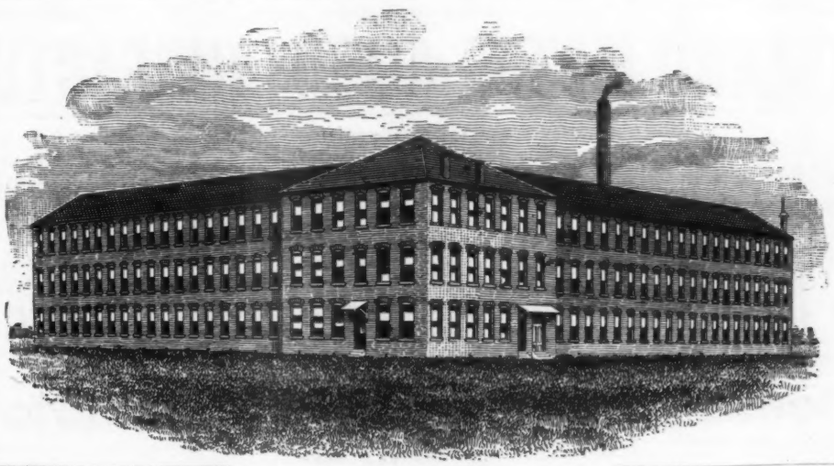

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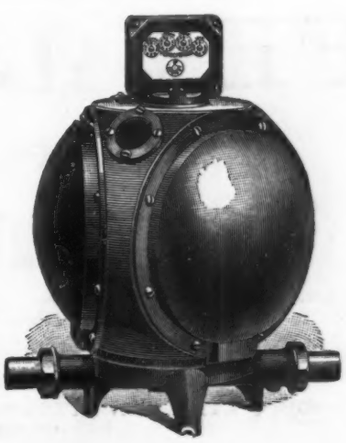

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